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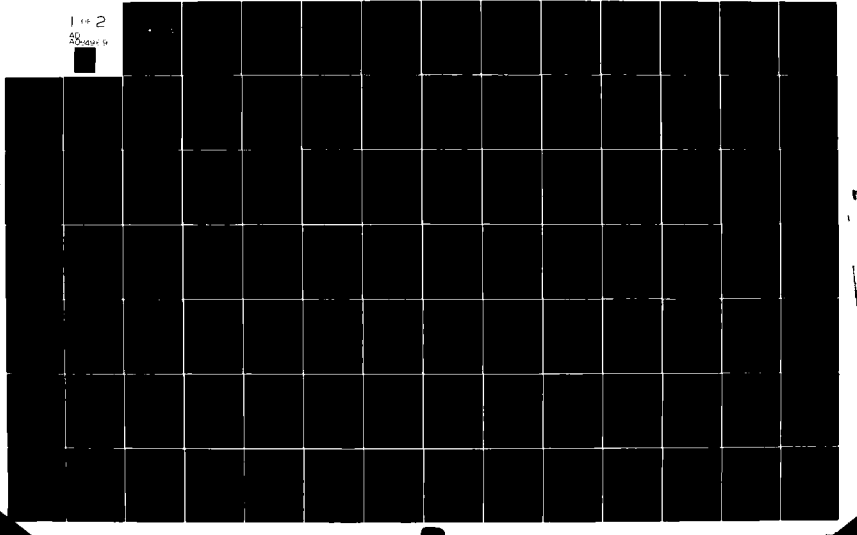

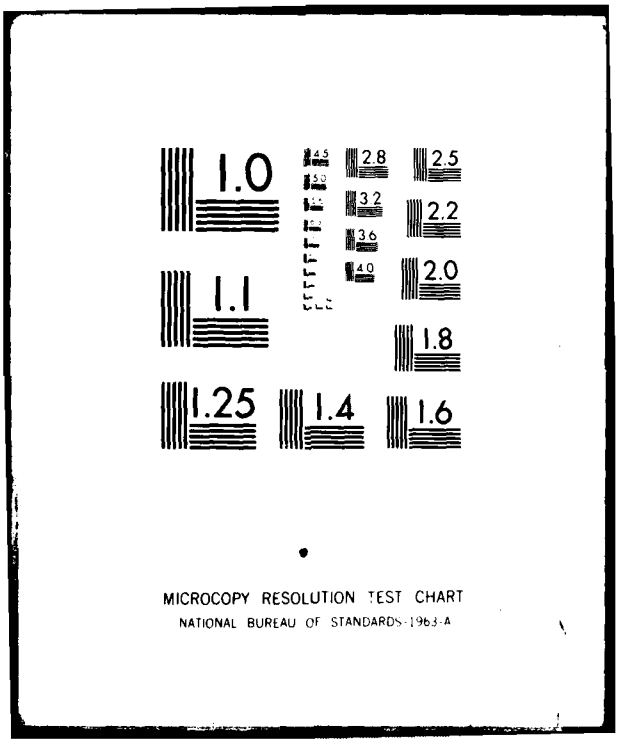
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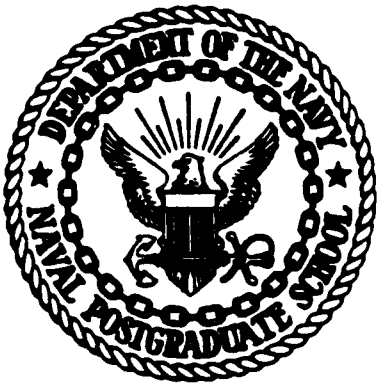

THESIS

APPLICATION OF
TECHNOLOGY TRANSFER PROCESS MODEL
FOR THAILAND

by

Pairoat Kaensarn

March 1980

Thesis Co-Advisors: J. W. Creighton
R. A. McGonigal

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The physical background of the country, national economy, and some characteristics of Thai people, which, from the author's perspective, have significant influences on the elements of the model and the knowledge transfer process itself are described.

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At the end of the study, a recommended strategy to improve the effectiveness of the knowledge transfer process and the efficiency of knowledge utilization within the country is proposed. The anticipated improvement of the transfer process is also briefly discussed.

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Application of Technology Transfer Process Model for Thailand

by

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Submitted in partial fulfillment of the
requirements for the degree of

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March 1980

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The purpose of this study is to apply the predictive model of Professor J. A. Jolly and Professor J. W. Creighton, to organizations in Thailand.

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I. INTRODUCTION

A transferring process of knowledge varies from one organization to another depending upon its own organizational factors, characteristics of the country and the people. J. A. Jolly and J. W. Creighton have been conducting research in this area and have come up with an interesting predictive model, namely, the Technology Transfer Process Model. The model is composed of formal and informal factors which help predict the effectiveness of the transfer process in an organization.

Thailand is a developing country which needs an effective utilization of technologies to manage her existing resources. Before the second World War, the Government of the country did not take an active role in the national economic growth. One of the reasons was that she had an abundance of natural resources. By the end of the nineteenth century, modern systems of education and some western cultures were introduced into the country and had great influences on the Thai people's ways of living and the country as a whole. The people's ways of life have been significantly changed since then and the natural resources of the country, from the author's personal point of view, have also been utilized ineffectively. Poor knowledge transfer process is one of the main causes for ineffective uses of the country's natural resources. The rapid population increase has caused many social problems,

resource crises, unemployment, and degradation in quality of life of the people.

To overcome these problems, upgrading the average level of education of the people is a worthwhile approach. But to take advantage of education, an improvement in the transferring process of knowledge within the organization seems to be an important mechanism that should be considered.

Barriers to the process of knowledge transfer have resulted from many causes. Physiographical aspects of the country, national economy, and characteristics of the people are among the factors. Resistance to change is an important characteristic of people that seems unavoidable and needs to be somewhat overcome in order to create a successful change.

As Creighton, Jolly, and Denning, in their Theoretical Model for Technology Transfer (1972), stated:

> Change is the way of life. Resistance to change is also a way of life. The only way that successful change can take place is to overcome the resistance to it and provide the proper organizational conditions to enhance it.

The author believes that if the predictive model is properly analyzed and applied to that organization, it will help solve the problems of an ineffective knowledge transferring process and the low efficiency of knowledge utilization within the country. And as a result the average level of education of the people will be upgraded and the effectiveness of the transfer process will be improved. It will also

contribute to a more effective commitment and management of the nation's resources.

A. PHYSICAL BACKGROUND OF THAILAND

Thailand, one of the Southeast Asian countries, is situated in the Indochinese Peninsula. On the north it is bounded by China and Laos, on the east lay Cambodia and Vietnam, on the south it is bounded by Malaysia and on the west by Burma. (Figure 1 shows the position of Thailand with respect to other countries of the region. Figure 2 is the map of Thailand itself.)

Bangkok is her capital surrounded by a great expanse of flat rice fields. Thailand may be divided into five physiographic provinces, namely, the Continental Highlands, the Central Plain, the Khorat Plateau, the Southeast, and the Peninsula (Figure 3).

The Continental Highlands may be subdivided into two sub-provinces: the Northern Hill and Valley and the Western Mountains. The overall area of this region consists of parallel and longitudinal folded mountains in continuation of the Himalayan System, which runs down through the east of Assam in India, Yunan Province of China and the Shan State of Burma. This great arc of ranges continues further south through the peninsula of Thailand and Malaysia.

The Central Valley may be physiographically divided into two distinct sub-provinces, namely, the Northern Rolling Plain and the Chao Phya Delta. The topography of the Northern

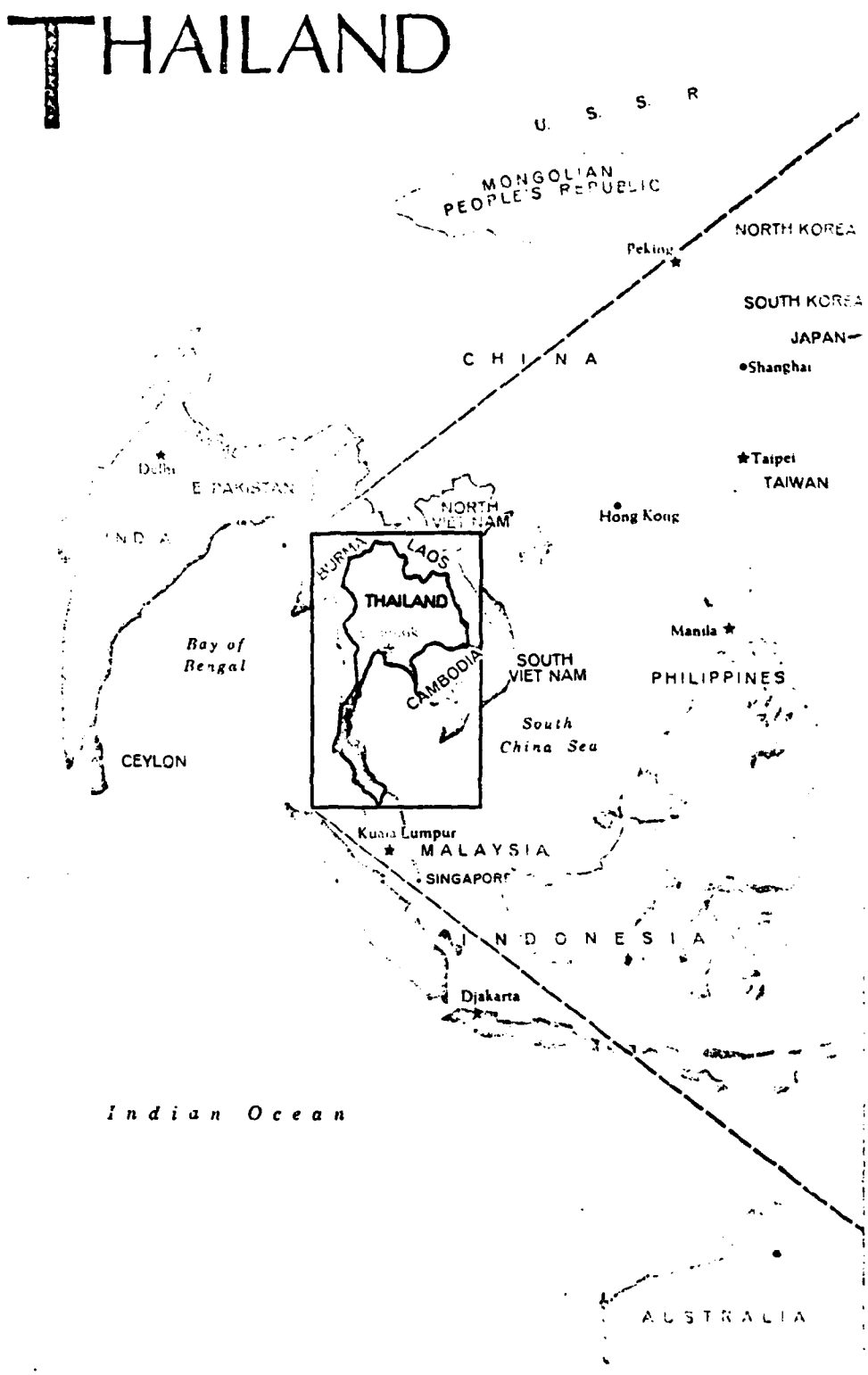

Fig. 1. The Location of Thailand with Respect to Other Countries in the Region.

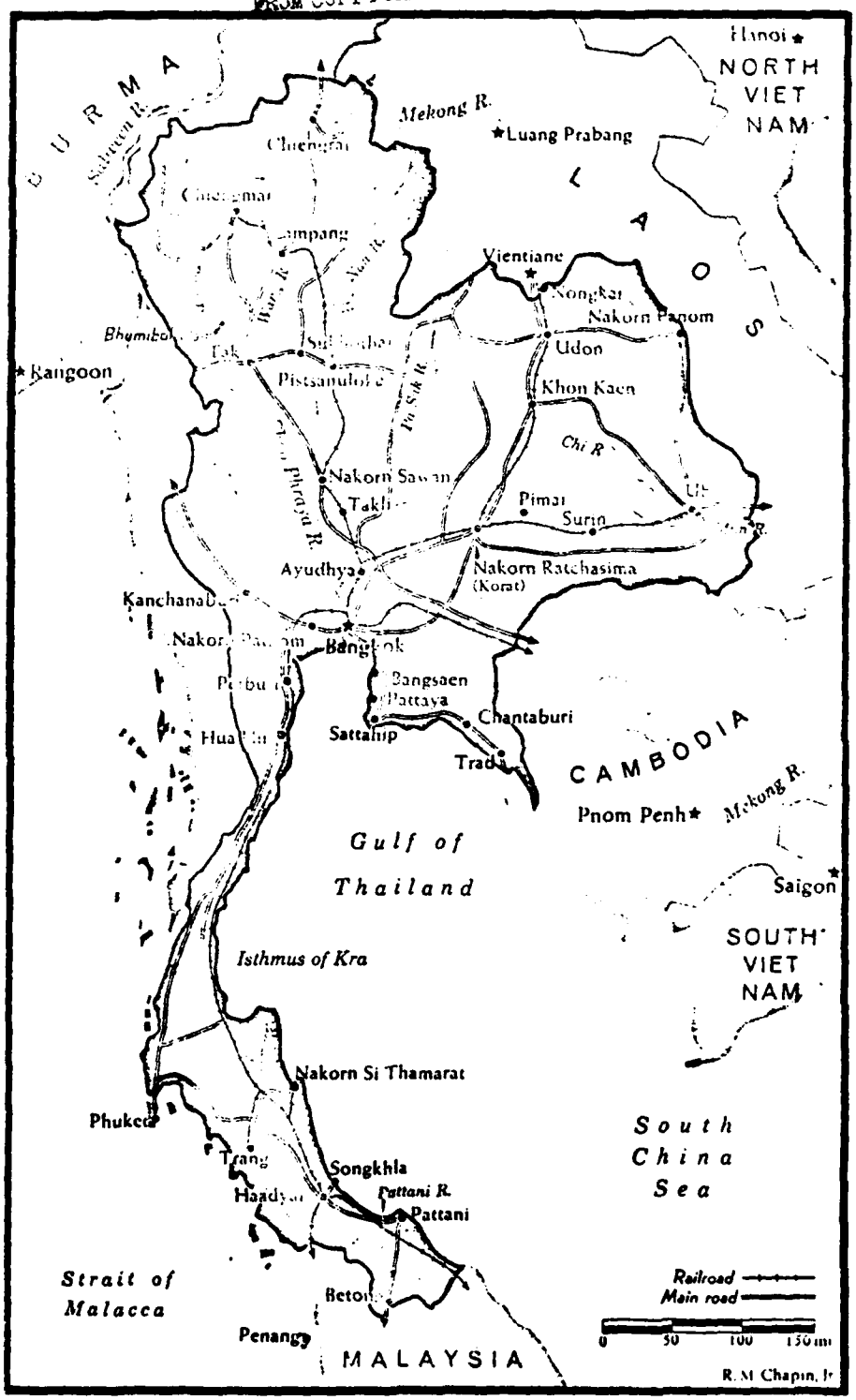

Fig. 2. A Map of Thailand.

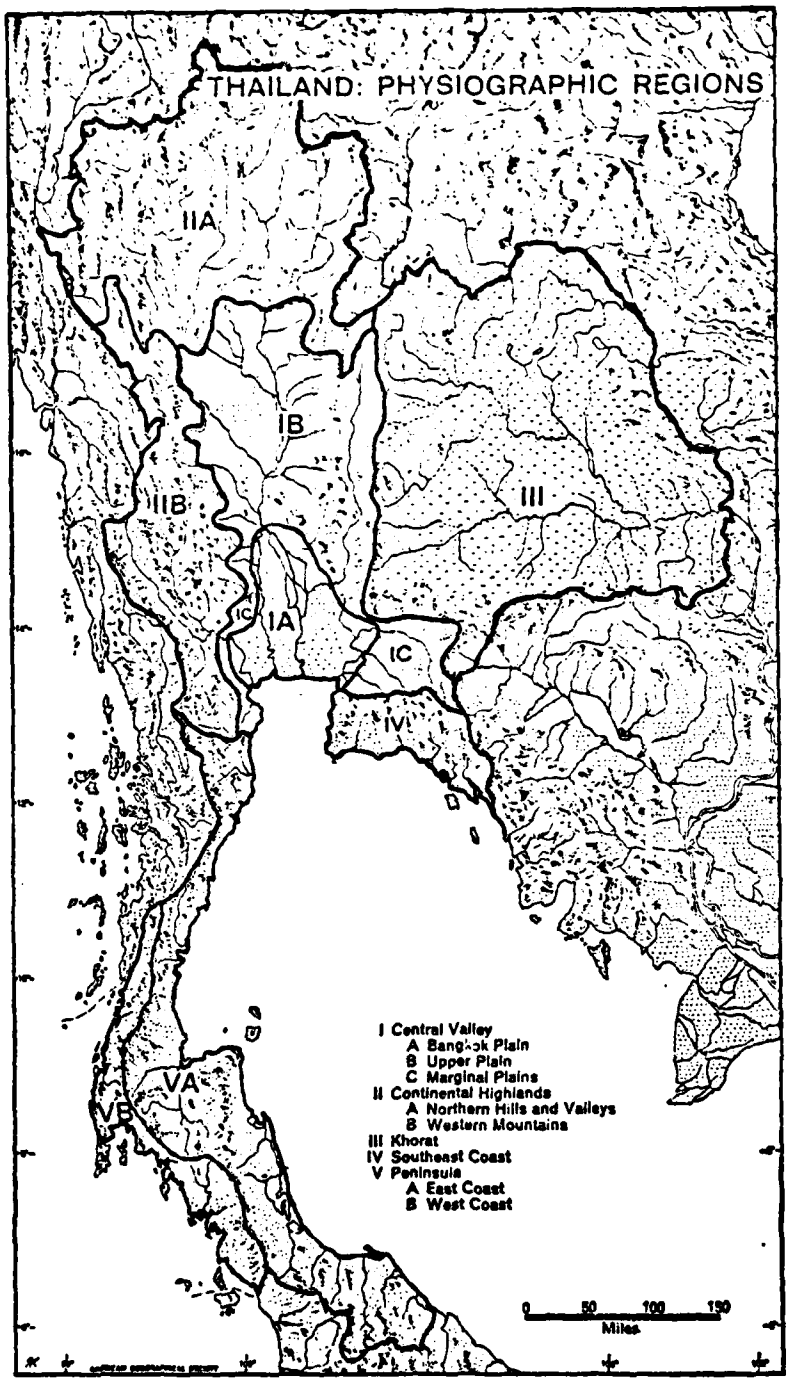

Fig. 3. Physiographic Regions of Thailand.

Rolling has been much dissected until its general surface has been leveled down much below that of the Northern Folded Mountains region, but it is still higher than the Chao Phya Delta. Only three major rivers flow through this rolling plain, namely, the Maenam Ping and Maenam Wang system, Maenam Yom, and Maenam Nan. All of these rivers join together at Pak Nam Pho to form Chao Phya river.

The Chao Phya Delta, another sub-province, commences south of Nakhon Sawan and extends down to the Gulf of Thailand. The triangular plain is traversed by two major rivers, Maenam Chao Phya and Maenam Tha Chin, the latter being known by many different names as it flows through different cities downto the gulf. The system of drainage in the Chao Phya Delta is the same as many deltas in other parts of the world, and is braided into many smaller channels. The flat land of Chao Phya Delta is generally low and is usually flooded by rain water in the wet season. This is very useful for rice growing. Bangkok, the capital of Thailand, is on the east bank of Chao Phya river and stands only 1.8 meter above mean sea level. The higher grounds close to the east and west side of the delta plain must be aided by irrigation. The Chao Phya Delta is the largest and most fertile plain of the country.

The Khorat Plateau consists of a two-sided fault and tilt rather than a uniform uplift of the strat of sedimentary rocks. The western tilt causes the range of Petchabun and Dong Phyayen to rise up longitudinally with their escarpments

facing the central plain on the west. The elevation of the tilted rim of the plateau on this side varies from 130 to 200 meters above mean sea level, while the flat top mountains of Dong Phyayen are generally between 800 to 1300 meters. The southern tilt separates the plain of Cambodia from the plateau surface. Thus the two levels of land are traditionally called the "Lower Cambodia" and the "Upper Thailand." Mekong River, which acts as the boundary between Thailand and Laos and meanders about the north and the east of the plateau. The governments of the two countries benefited by this river's system are determining to develop its water for agricultural and industrial purposes.

The Southeast Coast, another part of Thailand's rolling country with many hills in the center and along the eastern limit, extends from the foot of the San Kamphaeng range toward the south and includes Changwat Prachin Buri, Chon Buri, Rayong, Chanthaburi and Trate. The area is much dissected by numerous streams, all flowing in a southerly direction. This region is flanked on the east by a range of hills called Banthat (the ruler), because, when viewed from a distance the top of the range appears as a straight line. This mountain range forms part of the frontier between Cambodia and Thailand. The mountains in this region are close to the sea, the coast line is, therefore, much indented and fringed with rocky islands. The short streams of this region have built up small alluvial basins and deltas along the coast. These are utilized for rice cultivation.

The Peninsula region covers an area from Ratchaburi to the southern border between Thailand and Malaysia. The general topography is from rolling to mountainous, with a small amount of flat land. The northern portion from Ratchaburi to Chumphon is flanked on the west by a high mountain range which forms part of the frontier between Thailand and Burma. The east side consists of a long gentle sloping coastline, mostly sandy, touching the Gulf of Thailand. The streams and rivers here flow from short distances to the sea on the east. Numerous limestone hills standing precipitously over the rolling plain give much impression to the landscape of this region. The massive mountain on the west side attain the height of 1,000 to 1,500 meters. Some of the difficult passes leading from Thailand to Burma cross over these ranges. The southern portion of this province extends down to the Malaysian border and faces the sea on both sides, the Andaman on the west and South China Sea on the east. The streams and rivers in the southern portion are generally short and flow down to the seas on both sides. Many of the rivers in this region have built up delta lands suitable for rice cultivation.

II. NATIONAL ECONOMY, RELIGION AND CULTURE

In this chpater the history of Thai national economy and economic growth is briefly described. Population and unemployment growths are discussed and identified to be major causes of many problems limiting the effectiveness of the knowledge transfer process within the country. National religions, cultures, and some characteristics of Thai people which the author believes might have an impact on the transfer process are also considered.

A. NATIONAL ECONOMY AND ECONOMIC GROWTH

"The Thai economy can be regarded as a free enterprise economy. The price mechanism plays an important role of the growth process. Agriculture is the backbone of the national economy and the agricultural products are the main exports of the country." (Thailand Official Year Book, 1968, p. 360).

In the past, up to the Second World War, national economic growth was achieved without much active participation from the government, making it difficult to predict and shape the pattern. Later on, the government found it necessary to take an increasingly active role in the economic development of the country. In 1961, the First Five-Year Economic Development Plan was proclaimed, covering the period from 1961 to 1966. It was a successful plan. "The gross national product increased from 55,717 million baht in 1960

*baht: Thai monetary unit, approximately 5 cents (U.S. $0.05).

to 81,274 million baht in 1966. This 44 percent in total increase surpassed the planned target of 38 percent. The annual average rate of growth of 7.2 percent achieved during the Plan period surpassed the 6 percent growth rate target of the Plan and is substantially higher than the 5 percent growth rate of the past decade." (Thailand Official Year Book, 1968, p. 360).

1. Five-Year Economic and Social Development Plans

The Thai economy was for some time a monocultural economy based mainly on rice. The Thai Government has been concentrating on the diversification of the economy. Thus, the share of agricultural products has been declining as the economy becomes more diversified and other sectors grow at a faster rate. As stated in Thailand Officeial Year Book, 1968, p. 360, "The share of agriculture has declined from 39 percent in 1960 to 35 percent in 1966." Consequently, Thai people were forced to learn something new in order to fit themselves into the new changed environment. More farmers' sons did not want to be farmers when they grew up. More parents sent their children to get higher education in schools far away from home, mostly in Bangkok.

At present Thailand has a much stronger and more diversified economy as a result of the growth in both domestic and international markets and public investment in infrastructural projects, particularly irrigation and transportation.

The growth of the economy has also been accompanied by significant structural changes as a result of the increasing share of the gross domestic product originating from non-agricultural sectors, namely, manufacturing, construction, power, trade, and services. However, even if the government has been paying an increased role in the development of the national economy, only a small portion of manufacturing activities belongs to the public sector. As stated in "Thailand Official Year Book," 1968, p. 361:

> Most manufacturing activities are in private hands, state enterprises have accounted for only approximately 15 percent of total value added in manufacturing since 1962. This has been due to promotion privilege under the Industrial Promotion Act, which includes tax incentives as well as other benefit to many categories of industrial enterprises, both foreign and locally owned.

During the First Plan period, manufacturing growth advanced at a high rate as existing factories expanded their outputs and opened new plants including large scale industries, such as oil refining, textile, and car assembly. Production of cement, gunny bags, sugar, and paper in particular rose rapidly.

"In 1966, 2122 new factories were registered making the total number of 40,516 factories." (Thailand Official Year Book, 1968, p. 361).

"The growth of investment in terms of the gross fixed capital formation both in public and private sectors has been rising from 15 percent of the gross national product in 1961 to 22 percent in 1966. From 1960 to 1966, the value of gross

fixed capital formation increased from 8,150 to approximately 26,140 million baht." (Thailand Official Year Book, 1968, p. 362).

The healthy economic condition of the country resulted from the First Five-Year Economic Development Plan can be verified by the following tables, Figures 4 and 5.

The Second Five-Year Economic and Social Development Plan covering from 1967 to 1971 was also successful. Increases in volume of both public and private investments as well as the inflow of foreign capital helped generate income and employment. The relative importance of agriculture declined further as a result of faster expansion of non-agricultural sectors. Construction, transportation, electricity and power supply, and services contributed greater share to national output. Consequently, the national economy was further diversified.

During the Third Five-Year Plan period, 1972 to 1976, the national economy was affected by the political transition in Laos, Cambodia and Vietnam as well as internal political situations. However, the annual economic growth of 6.2 percent in real terms had been achieved against the 7.0 percent target set by the Plan. The national economy had also been further diversified, as shown in Figure 6. A steady decline in the population growth rate from 3.1 percent in 1971 to 2.6 percent in 1976 was another significant achievement. Other factors affecting the national economic growth were the past instability in international monetary system followed by the sharp rise in

Economic Indicators

		1965	1966 (Preliminary)
Population	(Million)	32.0	33.1
Gross National Product	(Million *Baht*)	81,285	96,811
Per capita GNP	(*Baht*)	2,539	2,925
Gross Fixed Capital Formation	(Million *Baht*)	19,156	23,131
Production			
Agriculture	(Thousand tons)		
Paddy		9,218	11,909
Maize		1,000	1,200
Rubber		217	220
Kenaf		420	550
Cassava		2,340	2,400
Teak	(Thousand cubic metres)	219	183
Yang	(Thousand cubic metres)	540	500
Fisheries	(Thousand tons)		
Fresh water		86	90
Marine		529	580
Industry			
Cement	(Thousand tons)	1,248	1,476
Gunny bags	(Thousand bags)	39,892	42,597
Paper	(Ton)	13,330	12,241
Sugar	(Thousand tons)	320	270
Cigarettes	(Million)	10,500	10,800
Cotton textile	(Million square yards)	237	260
Mining	(Tons)		
Tin		26,419	31,300
Lignite		124,967	171,132
Iron		750,474	691,700
Gypsum		11,240	39,629
Energy generated	(Million kilowatt hours)	1,342	1,802
Price level			
Wholesale price indices	(1958=100)	96	110
Consumer price indices	(1962=100)	103.8	107.7
Foreign Trade	(Million *Baht*)		
Exports		13,049	14,300
Imports		15,219	18,500

Fig. 4. Economic Indicators Showing Change From 1965 to 1966.

(Millions of *Baht*)

Industrial Origin and National Income	1960	1961	1962	1963	1964	1965	1966
Agriculture	21,688.8	23,165.7	24,306.8	25,109.6	24,609.1	26,090.1	33,942.2
Mining and quarrying	765.3	902.5	978.9	1,062.2	1,387.4	1,809.0	2,102.2
Manufacturing	5,882.0	6,642.0	7,437.2	7,874.3	8,704.2	10,045.7	11,628.8
Construction	2,010.3	2,137.5	2,719.7	3,378.2	3,748.9	4,284.2	5,274.4
Electricity and water supply	227.1	290.1	371.1	421.0	527.7	673.5	894.4
Transportation and communications	3,948.5	4,048.1	4,445.7	4,567.3	5,292.1	5,920.0	6,438.6
Wholesale and retail trade	9,660.2	10,307.8	11,573.9	12,034.4	13,895.8	15,002.6	17,000.8
Banking, insurance and real estate	1,275.6	1,519.4	1,887.2	2,087.6	2,357.7	2,770.5	3,403.0
Ownership of dwellings	2,556.9	2,696.3	2,856.7	3,018.7	3,240.2	3,550.2	3,870.5
Public administration and defence	2,706.6	2,949.9	3,031.7	3,302.8	3,504.2	3,738.0	3,987.5
Services	5,094.6	5,310.0	5,698.1	6,105.7	6,541.8	7,321.3	8,268.3
Gross domestic product (GDP)	55,815.9	59,969.3	65,307.0	68,961.8	73,809.1	81,285.1	96,810.7
Plus: Net income from abroad	—99.1	—93.3	—98.4	—40.4	—78.7	—11.1	—8.2
Gross national product (GNP)	55,816.8	59,876.0	65,208.6	68,921.4	74,730.4	81,274.0	96,802.5
Less: Indirect taxes	4,648.0	5,110.0	5,337.9	6,364.8	6,673.2	7,249.8	8,681.2
Capital consumption allowances	2,158.2	2,457.8	3,007.2	3,737.9	4,231.3	6,055.3	7,332.2
National income	48,910.6	52,308.2	56,863.5	58,818.7	62,825.9	67,968.9	80,789.1
Per capita GNP (*Baht*)	2,056.4	2,137.3	2,251.0	2,301.0	2,380.8	2,538.5	2,925.0

Source: National Accounts Division, NEDB.

Fig. 5. Gross National Product by Industrial Origin and National Income.

world prices of major commodities, particularly food items and raw materials since 1972 and the increase of crude oil prices. These influences generated subsequent inflation and recession, and set Thailand behind her planned economic growth and employment generation since 1974.

Categories	Third Plan Target	Actual Rate of Growth
1. Gross Domestic Product	7.0	6.2
2. Population	2.5	2.6
3. Per Capita Income	4.5	3.3
4. Agricultural Production	5.1	3.9
5. Manufacturing Production	8.0	8.6

Fig. 6. Actual Economic Performance as Compared to the Third Plan Targets.

Although rapid strides were made in development during the Third Five-Year Plan period, the country continued to face the problem of slow economic recovery, interregional and rural-urban income disparities, population growth and unemployment, and basic resource depletion and environmental deterioration. The development issues and problems are manifestations of structural weaknesses in the national economy and social structure which require more basic reforms and need development directions.

At the same time, under the current fast changing political and economic circumstances, the nature and scope of the Fourth Five-Year Plan have been shifted to be more flexible or indicative in nature instead of rigidly allocative. It is also a problem oriented plan which incorporated the spatial dimension rather than a macro sectoral programming exercise. Particular emphasis has been stressed on the decentralization of public investments to rural areas and less developed regions in order to upgrade the standard of life among the poor majority.

As stated in the "Summary of the Fourth Five-Year Plan," the National Economic Social and Development Board, Office of the Primeminister, Bangkok, Thailand (1976, p. 3), the national development objectives of the Fourth Five-Year Plan are summarized as follows:

a. To accelerate economic recovery during the period of 1977-1978.
b. To reduce income disparities.
c. To reduce population growth rate, improve manpower quality and increase the level of employment.
d. To improve the management of critical resources and rehabilitate environmental conditions, and
e. To strengthen national security management.

In order to achieve these development objectives, the Fourth Five-Year Plan stresses heavily on the importance of a growth pattern that is more consistent with the longer-term aims of reducing existing socio-economic disparities and

accelerating rural income and employment. At the same time, the Fourth Five-Year Plan also recognizes more immediate development objectives to accelerate faster economic recovery and a greater degree economic stability during the first two years of the Plan, 1977 and 1978, in order to build up a more solid foundation for further development during the later half of the plan period. The following overall targets have been set (as shown in Figure 7).

Sector	1976 (Estimated) (Million Baht)	1981 (Targets) (Million Baht)	Average Annual Rate of Increase (%)	
			Third Plan Period	Fourth Plan Target
1. Agriculture	46,113	58,706	3.9	5.0
2. Industry	35,575	56,277	8.6	9.6
3. Mining and Quarrying	1,762	2,066	-0.5	3.2
4. Construction	6,951	8,059	2.4	3.0
5. Electricity & Water Supply	5,737	9,794	14.4	11.3
6. Transport & Communication	11,780	16,857	8.1	7.4
7. Wholesale & Retail Trade	28,792	39,080	4.8	6.3
8. Banking, Insurance and Real Estate	8,852	13,063	10.9	8.1
9. Ownership of Dwellings	2,861	3,555	3.6	4.4
10. Public Administration and Defence	7,546	10,331	6.0	6.5
11. Services	18,897	27,470	8.2	7.8
Gross Domestic Product	174,866	245,258	6.2	7.0

Fig. 7. Production Targets Classified by Sector (at constant 1962 prices).

From the history of economic and social development of Thailand previously described, one can consider that Thailand has been facing many problems needing careful handling. She used to have more than sufficient natural resources to meet her corresponding social needs. Most of the Thai people are very familiar with the phrase, "NAI NAM MEE PLA-NAI NA MEE KHAO" which means that there are a lot of fish in the water and there is a lot of rice in the field. That type of situation did exist in the last few decades, but excessive resources have caused carelessness and resulted in ineffective consumption and misallocation. On the other hand, scarce resources often help create good management and effective uses of them.

Diversification of the national economy, faster expansion in non-agricultural sectors, and a high population growth rate, 2.6 to 3.0 percent, are big consumers of the nation's resources. They have caused both advantageous and disadvantageous results to the society. For example, as the national economy is more diversified, it results in an increase in gross national product and employment. But, at the same time, it causes the problems of ineffective consumptions of natural resources and dirty environment.

An increase of crude oil prices has created a huge impact on the national economy. Oil is the main source of the overall energy available. It is a significant part of producing costs of both agricultural and non-agricultural products and even public services. The increase in its

price has been generating inflation and poverty among the poor majority.

Unproportional public and private investments in rural areas and less developed regions have also caused many critical problems, such as labor surplus areas, poor public facilities and poverty in those areas. Many of the people had to leave their home town in order to seek a better livelihood, find another job that yielded better income. Most of the cases they move to Bangkok, the capital city of the country, or the general vicinity because it is easier to earn more money. Consequently, population density of these areas, particularly in Bangkok, has been rapidly increasing with resulting high traffic congestion, pollution and environmental deterioration.

B. POPULATION AND UNEMPLOYMENT GROWTHS

As stated in the Population and Employment Targets of the Fourth Plan, "Summary of the Fourth Five-Year Plan" (1976, p. 8), the total population at the beginning of the Plan was 42.96 million persons, in 1977, and would increase to about 48.18 million persons in 1981, the last year of the Plan period. The population growth rate in 1977 was 2.6 percent. Hopefully it would be reduced to 2.1 percent in 1981. Out of 42.96 million persons in 1977, 19.67 million constituted the labor force. Of these 19.67 million persons, 1.117 million were unemployed, about 5.7 percent of the total labor force. It was also said that in 1981 there would be 21.601 million persons for total labor force and 1.203 million

persons would be unemployed, which is approximately 5.6 percent (as shown in Fig. 8).

The growth pattern of the population and unemployment have been other main causes of problems such as degradation in quality of human resources, rural-urban income disparities and criminals. To handle these problems, the government has been trying to increase employment by decentralizing public investments to rural areas and less developed regions. This national objective does yield some valuable by-products to the society in that knowledge and information are transferred to the people of the country as a whole. For instance, public education, transportation and communication are necessarily improved, some technologies that were hardly known by most of the people are more likely to be utilized. Consequently, some factors or mechanisms of the Technology Transfer Process Model which will be discussed in a later chapter, will be automatically improved.

Items	Number (thousands)			Growth Rate (per annum)	
	1972	1977	1981	1972-76	1977-81
Whole Kingdom					
Labour Force	17,363	19,670	21,601	2.6	2.3
Employment	16,503	18,553	20,398	2.4	2.3
Unemployment	860	1,117	1,203	5.0	2.8
(Unemployment rate)	(5.0)	(5.7)	(5.6)		
Municipal Areas					
Employment	2,056	2,516	3,011	5.1	4.6
Non-municipal Areas					
Employment	14,447	16,037	17,387	1.0	2.0

Fig. 8. Projections of Labour Force, Employment and Unemployment.

C. RELIGION OF THAILAND

The equal opportunities to practice or preach any faith are open to people. Several religions and doctrines have been introduced into the country. The religions have considerable impact on changes which come about and the rate at which usage of technologies and new knowledge takes place. These religions and doctrines are:

Religions

1. Buddhism
2. Islam
3. Christianity
4. Hinduism
5. Sikhism

Doctrines

1. Confucianism
2. Taoism
3. Shintoism
4. Animism
5. Others

"Buddhism, especially Theravada Buddhism, is the State Religion and the great majority of Thai people are Buddhists, approximately 93.6 percent in 1960. However, the Thai Government of every period has bestowed upon people freedom to profess any faith they like and has been pleased to welcome any missionary of any faith to preach its tenets anywhere in Thailand. A person shall have complete freedom to profess any religion, domination or doctrine, and shall have freedom to practice any religious rites in accordance with his belief

except insofar as they are inconsistent with his duty as a citizen or incompatible with public order and good morale. The Thai Government has accorded the people not only religious freedom but also full support to their faiths." (Thailand Official Year Book, 1968, p. 528).

1. Buddhism

Because the great majority of Thai people are Buddhists, Buddhism, particularly Theravada Buddhism, will be the only religion discussed.

"The Buddhist community arose in India in the sixth century B.C. In time it spread southward into Ceylon, Burma, Siam (Thailand), and Southeast Asia, generally, and northward across Central Asia into China, Korea, and Japan, while directly from India it passed into Tibet in a mixed form which also became the 'Buddhism of Mongolia'." (Buddhism, A Religion of Infinite Compassion, Clarence H. Hamilton, p. xi).

As a religion, Buddhism is very simple if we consider its basic and persistent ideals. Normative Buddhism, as is well known, is currently expressed in two major forms: Mahayana and Theravada. The latter form of Buddhism is found in Southeast Asia, most notably in Burma, Cambodia, Ceylon, Laos and Thailand. The following discussion will be only about Theravada Buddhism and for simplicity, the author will henceforth designate it merely as "Buddhism."

J. H. Bateson, in "Creed (Buddhist)," Encyclopedia of Religions and Ethics, Edinburg, T. & T. Clark (1911)

summarizes the teaching of Buddhism in five concepts, namely, materialism, atheism, nihilism, pessimism, and egoism.

Melford E. Spiro, in "Buddhism and Society," (1972, p. 7) briefly discusses these concepts as follows:

a. Materialism

Contrary to almost every other religion, one of the foundation stones of Buddhism is the doctrine of nonsoul. Man is an aggregate of five material factors and processes which, at death, disintegrate without residue. The belief that behind these material processes there exists some spiritual or incorporeal essence--a soul--which guides and directs behavior and which survives the dissolution of physical body, is a Buddhist heresy. The building block of the world, and of a man, is the atom. Man, like the rest of the world, consists of atoms in motion.

b. Atheism

Buddhism is a religion without God. Just as the body has no soul which guides and directs its action, so the universe has no Creator who brought it into being, who guides its course or who presides over the destiny of man. More important, there is no Being--no Savior God--to whom man can turn for salvation. Each man, as it were, must save himself. Durkheim (1954:29-32), it will be recalled, was so impressed with the Buddhist example that he argued that the belief in God could not be used as a defining characteristic of "religion." Other scholars, themselves the products of the eighteenth century enlightenment and of nineteenth century

rationalism, found the precursor of these latter movements in Buddhism. Believing that it denied soul and God, and that it abjured reliance on mysterious forces and supernatural powers, Buddhism was viewed by many of its western interpreters as an essentially ethical religion, akin in modern humanism or ethical culture.

c. Nihilism

The doctrine of no-soul is intimately associated with a second building stone--the doctrine of impermanence. According to Buddhism, everything in the universe, including the universe itself, is impermanent. There can be no supreme reality because anything that it "real"--anything that exists--is in perpetual flux, in a constant state of creation and dissolution of coming into and passing out of existence. But Buddhism made an even more radical claim--and this is a second meaning of Buddhist Nihilism--even if there were some permanent reality, perhaps some conditions of immorality, it is not a condition to which man ought to aspire. Rather than aspiring to an external existence, the Buddhist (in theory) aspires to the extinction of existence (at least as we ordinarily understand "existence"). Like all Indian religions, the aim of Buddhism is to bring the otherwise endless cycle of rebirth to an end.

d. Pessimism

Buddhist Nihilism is reasoned, not capricious. Just as Calvinism teaches that there is no conceivable act of even the most righteous man which is not sinful (in the

sight of God), so Buddhism teaches that there is no conceivable act of even the happiest man which is not painful (when analyzed in the crucible of Buddhist meditation). Associated with the doctrine of no-soul and impermanence, the doctrine of suffering forms the third famous Buddhist trinity. From the lowest hell to the highest heaven, suffering is an inescapable and essential attribute of life. Since so long as there is life, there is suffering, the only reasonable goal to aspire to, according to Buddhism, is the extinction of life as we ordinarily understand it.

e. Renunciation

Buddhism is a religion, par excellence, of other worldly asceticism. Viewing attachment to the world as the cause of suffering, and hence as an inreducible obstacle to salvation. Buddhism insists that suffering can only be escaped through the detachment from and renunciation of the world. By renouncing the world, the Buddhist aspires to detachment from persons, from material possessions, and even from himself (his sensation, his desire, and his self).

The five concepts previously described, the teachings of Buddhism, have made Buddhist people perceive themselves and their surroundings as somewhat different from most of any other religion's people. Real Buddhist people tend to pay more attention to their minds' development than to the development of their surroundings. They have been practicing themselves to be satisfied with their beings. They have been taught that the human's needs are unlimited and very hard to

control, and are the main cause of all suffering. "No needs can be perfectly satisfied," this trend of thought has made Buddhist people try to control their needs, limit their satisfactions, and develop their minds. They are more sympathetic than competitive because they believe that "the more you give, the happier you are."

Shao Chang Lee, in his Popular Buddhism in China (pp. 21-22), translated some interesting Buddhist proverbs as follows:

> Without suffering one cannot become a Buddha.
>
> When all is well, one neglects to burn incense, when in pressing needs, one embraces the Buddha's feet.
>
> Provide convenience to others at all times, accumulate merits of all kinds.
>
> The foundation of Buddhism is compassion, its door is convenience.
>
> Close your eyes; your ego and beings are all void.
>
> Beauty does not delude man to folly, it is man who deludes himself to folly.
>
> Each receives in accordance with that which he cultivated.
>
> To know the causes emerging from the previous, look at your present lot, to know the causes affecting the future life, look at your present deeds.
>
> The truth of Buddha is infinite, the door of truth is wide open.

While Thailand has encountered several crises through the centuries, Buddhism has never even once suffered any ill fate in the country. To the contrary, it has flourished here

from the earliest times. It had a profound influence over the Thai arts, culture, tradition, and learning. More important still, it has dominated the character of the vast majority of the Thai people. The Buddhist way of life is an integral part of national life. On these facts, the Government deems it a duty to give protection and promotion to Buddhism.

2. Buddhist Ordination in Thailand

It is the tradition that young Buddhist men enter the SANGHA when they are twenty; however, some men join the Order later in life. As the essence of ordination lies in the faith and devotion of the individual, there is no fixed period for which a person should remain in the Order. In practice most young men join the Order for three months during the Buddhist Latent; some stay longer and a few devote the remainder of their lives to the SANGHA.* With their monkhood, they study and practice DHAMMAS,** the teachings of the religion, which are established by Buddha, the originator of Buddhism over twenty-five hundred years ago.

3. Contribution to Buddhism to the Society

Buddhist monks not only study and practice for themselves, they also try to teach DHAMMAS to those people who wish to improve their faith in Buddhism by having them come to the monasteries. Or, the monks may go to their homes, depending upon requests.

---

*SANGHA: Buddhist organization having Buddhist monks as members.

**DHAMMAS: Buddhist teachings established by the Buddha in 688 B.C.

"Buddhist monasteries are constructed from charitable contributions from the general public. In order to obtain a permit to build a monastery, the promoter must submit a detailed proposal of the construction to the Sangha Supreme Council through the Department of Religious Affairs. After the Sangha Supreme Council has granted a permit, the monastery can be built." (Thailand Official Year Book, 1968, p. 536).

One of the most outstanding activities of the Buddhist Order in Thailand is the substantial contribution toward public education. For centuries, Buddhist monasteries have been centers of learning with BHIKKUS as teachers. When modern systems of education were introduced into the country at the end of the nineteenth century, BHIKKUS still played an important role as teachers and a great number of Government schools, both primary and secondary, were conducted in monasteries.

Although at present fewer BHIKKUS* teach in schools, and the number of monastery schools has fallen, a large number of schools are still attached to monasteries. This is one reason why the majority of Thai people are Buddhists. In monastery schools, not only are modern sciences taught, but also some basic principles of DHAMMAS. So most of Thai children in those days started to learn and know about Buddhism since they were young. Many boys even stayed with BHIKKUS they liked in order to take care of those BHIKKUS and be higher educated at the same time. Each Buddhist monastery,

*BHIKKUS--Buddhist monk whose age is 21 years or more.

at that time, had about an even number of BHIKKUS and boys taking care of them.

The system yielded a great educational benefit to society as a whole because most of those boys were from low educated areas or from poor families. They could not have been as highly educated from family support alone.

"On June 30, 1966, Thailand had 24,105 monasteries and 175,266 BHIKKUS, or about 0.57 percent of the total population." (Thailand Official Year Book, 1968, Table 66, p. 544).

D. CULTURE AND SOME CHARACTERISTICS OF THAI PEOPLE

In this section characteristics of the people resulting from their culture and religion which somewhat affects the transferring process of knowledge are discussed. Those which could create resistance to change of the organization are stressed.

1. Origin and Migration of the Thais

About 4,500 years ago, Thai people originated in northwestern Szechuan, somewhere in the southern part of the Republic of China. They then spread out, according to their inclination of the fan-like manner along the Yantse Valley in order to seek a better livelihood. They were divided into tribes or groups, each tribe or group being ruled by its prince or chieftain. Just as the Chinese, the Thais belong to Mongolian stock. At the time the Thai people first arrived in the area, the Chinese were already

a great and old race and they apparently regarded themselves as being superior to the Thais. The Chinese gradually began to encroach upon them and pressed them hard. Due to their lack of unity, the Thais could not organize an effective resistance to the Chinese onslaughts. Some of them submitted to Chinese rule and were eventually absorbed by them, while others made attempts to preserve their independence. In order tc attain their objective, they started their southward migrations gradually and intermittently, as they were able to collect their own people who were prepared to face unflinchingly hardships and dangers. The first wave of these migrations occurred at the beginning of the Christian era. In the meantime, they came to call themselves "THAI."

The Thais followed the river valleys in their movement toward the south and separated into many small groups. Each group chose their own route for the later migrations. The western group of the Thais descended along the Salween River where they settled down and became SHANS or the so-called "GREAT THAI." The other group keep on moving further southward until they found the rich land of the Indo-Chinese Peninsula. They gradually replaced the Mon-Kkmers and Lawas who had been living there, and formed themselves into the Kingdom of Chiang Saen. They permanently settled down on that land and anticipated no further migrations. Today that land is know as "THAILAND or PRADHAET THAI."

2. Seniority and Interpersonal Communication

By having the long history of migration, they had to fight with many groups of enemies in order to preserve their independence. The leader of a group played the most significant role in protecting the people. Those situations have made Thai people strongly respect their leaders from the head of the group down to the heads of their families. They have also respected older people because they trust their experiences about life and survivability. The older people used to relate what they had known to the younger people, particularly within the families and especially about their own careers. But this trend has been gradually changed since the modern systems of education were introduced into the country.

At present the people's ways of life depend more on materials and some other means than on the people themselves. However, most of the Thais still respect seniority of people either in higher ages, ranks or education but not as strongly as they used to.

3. Greng-Jai

Another characteristic of Thai people which the author believes might somewhat affect the transferring process of knowledge within the country is the so-called "Greng-Jai." It is a Thai word which represents an uncomfortable feeling resulting from communicating with a person who is superior in some fashion, e.g., a monk, older people, and policemen. This feeling is somewhere between honoring and being afraid which could partially create a barrier to

the interpersonal communication. An argument between an employee and his boss, a student and his teacher, and even a child and his parents is much less likely to occur. This trend has also been gradually changed by the development of the public education, and particularly by the influence of western cultures, especially among the people in the larger cities.

The so-called "Greng-Jai" in someone's mind does not occur only when he needs to communicate with a person deserving respect, but also with any people who have been helpful to them. They tend to avoid having an argument with those people or even expressing some reasonable disagreements. This frequently causes an inappropriate final decision when group decision making is needed. "Greng-Jai" sometimes makes a person too easily accept or believe in an idea from one he respects even though the idea might be bad for his organization. Thus "Greng-Jai" could be viewed as a part of creator or reducer of resistance to change within an organization.

4. Katanyoo-Katawetee

This is another characteristic of Thai people that makes them different from people in many other parts of the world. "Katanyoo" means the recognition of an assistance or kindness that one obtains from the other(s). "Katawetee," another part of the word, is an effect or intention to be helpful to a person who used to be helpful to them. These two parts of the word always come together, namely, "Katanyoo-Katawetee" (similar to the Chinese Guangshi).

This characteristic of Thai people results directly from their religions, mostly from Buddhism. It is one of the religious teachings that has had a great influence on Buddhist people. They believe that to have "Katanyoo-Katawetee" is one of the ways leading to one's future success.

One's parents and teachers seem to be the first group of people that one has strong "Katanyoo-Katawetee" for. Most Thai people like to stay with their parents until they get married in order to obtain good care from them and take care of them when they become old. After marriage, most of them still try to live near their parents, some of them even continue living with parents, in which case most of the women move to live with their husbands' families. This trend has made many Thai families very big, with large numbers of members ranging from grandparents to grandchildren. This doctrine has made Thai parents have great influences over their sons and daughters. In olden times parents even chose marriage partners for their children by only making an agreement among the parents of the couple. There were also some cases in which the bride and the groom had never met one another before the marriage. But this custom is dying out even in the villages.

While modern systems of education had not yet been introduced, most Thai parents used to be their children's teachers. They related what they had known, particularly about their careers to those children. This created strong interrelationships within families and caused people in those

days to earn their living in almost the same ways as their parents had done.

Today even though the modern system of education has significantly changed Thai people's ways of life, "Katanyoo-Katawetee" is still in most of the people's mind. A modern technology or knowledge will not be attractive to some people if it forces them to leave their parents too early. This situation could partially create resistance to change in an organization even though the change may have advantages to the people as well as to the society as a whole.

III. TECHNOLOGY TRANSFER PROCESS MODEL

In this chapter the predictive model of J. A. Jolly and J. W. Creighton as well as its elements are described. Influences of Thai organizational factors on each element of the model are also discussed. At the end of the chapter an over view of the problems in the transferring process of knowledge within the country is submitted. What is the technology transfer process?

The Directory of Federal Technology (1975, p. v) offers one definition of technology transfer which adequately reflects the quality of the subject. It is:

> The process by which existing research is transferred operationally into useful processes, products, or programs that fulfills actual or potential public or private needs.

Jolly, Creighton, and George in "Technology Transfer Process Model" (1978, p. 1), also stated that "....The term "research," as used in the definition, should be interpreted in its broadest sense to include development in the many fields ranging from Aerospace to Mental Health to education. The concern is that of taking an existing idea or body of knowledge, from any of these fields, and using it in a different place, in a different way."

A. A SIMPLIFIED VIEW OF THE TRANSFER MECHANISM

"The transfer mechanism represents the interaction of people and need not be independent, but may be incorporated

in either the supplier or user environment." (Jolly, Creighton, and George in "Technology Transfer Process Model," 1978, p. 2).

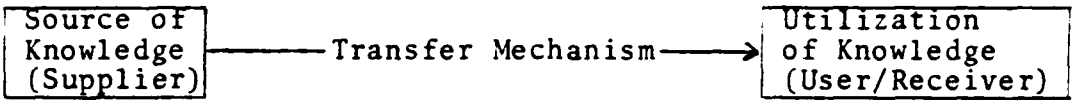

Fig. 9. A Simplified View of the Transfer Mechanism

The transfer process of knowledge or information could be roughly viewed as the movement of information from its source, namely, supplier to user's or receiver's organization via the transfer mechanism. Efficiency of the utilization of knowledge depends on how effective the mechanism is. The transferring mechanism could be further divided into two groups of organizational factors, formal factors and informal factors, as shown in Fig. 10.

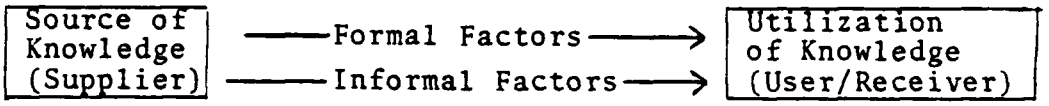

Fig. 10. Knowledge Flow Enhancement Factors

Jolly, Creighton, and George described that..."Formal factors are procedures for dissemination of storage indexing and retrieval of knowledge while the Informal Factors are interpersonal communication and contacts, personal beliefs and feeling about knowledge source, perception about one's organization supervisors and peers." (Technology Transfer Process Model, 1978, p. 3).

More specifically, the authors subdivided the Formal Factors into four different factors, namely, Method of Infromation Documentation (DUCU), the Distribution System (DIST),

Formal Organization of the User (ORGA), and Selection Process for Projects (PROJ). Informal factors are subdivided into five factors: Capacity of the Receiver (CAPA), Informal Linker in the Receiving Organization (LINK), Credibility as Viewed by the Receiver (CRED), Perceived Reward to the Receiver (REWA), and Willingness to be Helped (WILL) (as shown in Fig. 11).

Jolly, Creighton, and George further discussed that.... "Formal Factors are more tangible, objectively measurable, and subject to external than the informal factors. The way these factors impact upon decision makers in the user or receiver organization determines whether they will be an aid or barrier to the transfer process." (Technology Transfer Process Model, 1978, p. 4).

B. DISCUSSION OF THE ELEMENTS OF THE MODEL

In this section each element of the model is related to both the original model and the Thai organization. The four elements of the formal factors are discussed first and then the last five informal factor elements.

1. Formal Factors

a. Documentation

Jolly, Creighton, and George described that.... "This is the format, specification, and presentation of the technology or information being transferred...format and language relate directly to the understanding of material by the receiver. One cannot utilize information that one cannot understand. Reports should be designed to promote the desired behavior." (Technology Transfer Process Model, 1978, p. 5).

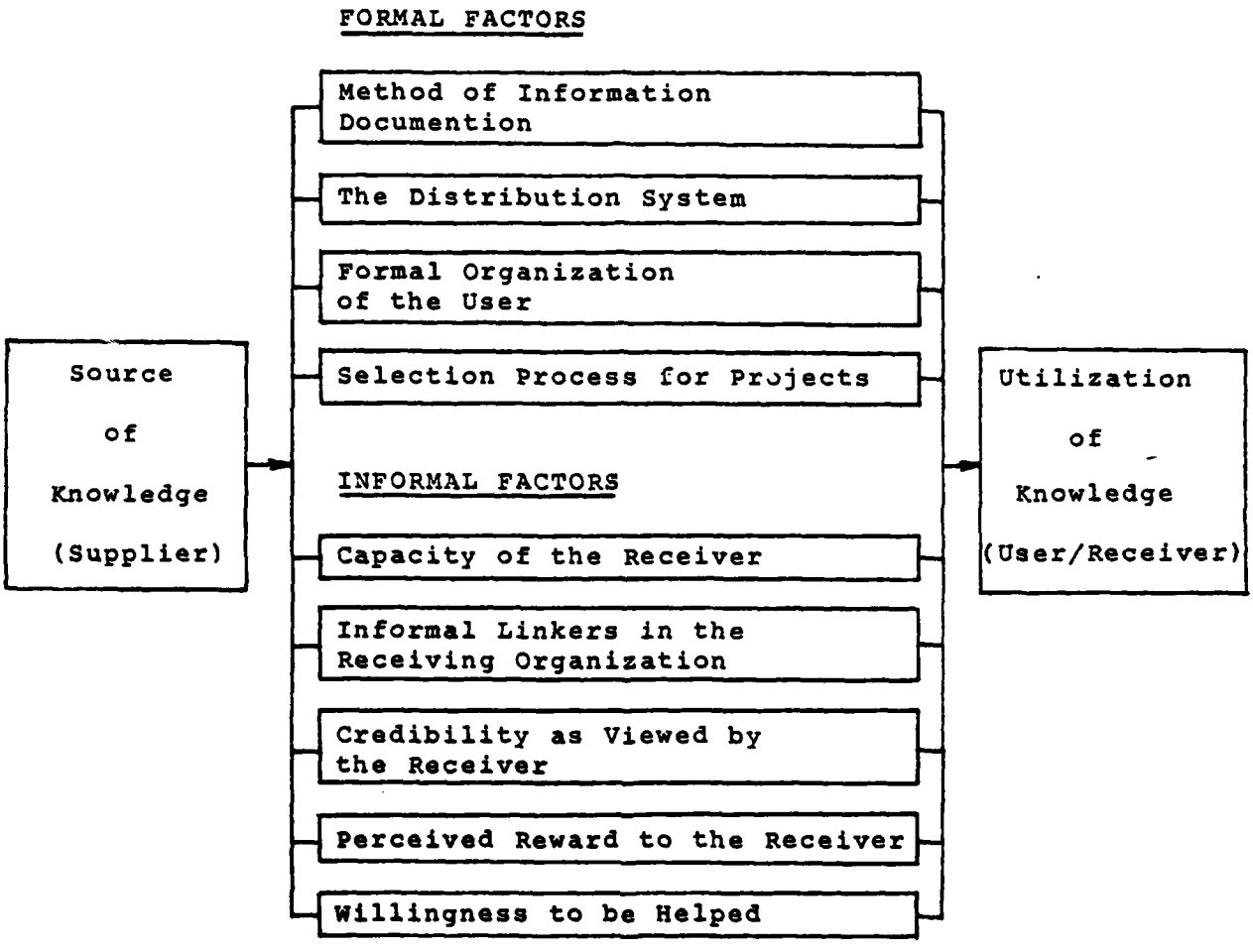

Figure 11. An Expansion of the Predictive Model of Technology Transfer.

In Thailand the Thai language is the only official language. It has been used for centuries and most of the people know how to read and write the language. They also speak the same language in all parts of the country. In fact, there are four or five dialects each used by the people living in a specific part, but they are not so considerably different from one another than this group of people cannot communicate with the people from the other parts by that dialect.

Generally speaking, information documentation in Thailand has been aiding and accelerating the transferring process of the information itself by having the majority of people speak, read and write the same language.

Problems arise only in some specific fields of knowledge or information, particularly about modern technology and sciences, when they are documented in another language having originated from outside of the organization and not yet translated into Thai language.

Specifically, most of the knowledge of information which is still in its original form is involved in high levels of national education, college level or above, or in some particular types of business. For instance, for education in university or higher levels, most textbooks are written in English in order to keep the original meaning of information. This problem has created barriers to the process of technology transfer within the country. But it does not have a great impact on the organization as a whole when considering the majority of the people.

The students studying in the colleges and universities, and the people working in some types of business who are to utilize the information documented in another language are only relatively small groups. As stated in the Second Five-Year Economic and Social Development Plan, "In 1961 there were about 80,000 students in all colleges and universities, approximately 2 percent of the total population." (Thailand Official Year Book, 1968, p. 495). These people are qualified because they were selected from a much larger group before they could obtain their seats in those educations institutions.

In short, the effectiveness of this element of the model, if applied in Thai organization, would be affected by two different groups of people. The first group is the majority of people who are educated not higher than high school level. These people are more likely to utilize well documented information in their own language which helps accelerate the transferring process of information. The other group is involved in utilizing a lot of knowledge documented in another language, mostly English. But these people are a minority group and well educated. So this problem does not have a significant impact on the transferring process of knowledge as far as the documentation is concerned. However, if information documented in another language had been translated into Thai language, the efficiency of utilization of the information would have been significantly increased.

b. The Distribution System

As described by Jolly, Creighton, and George, "This factor is the physical channel through which technology flows, involving both the number of entries and ease of access into the channel, as well as the formal distribution plan as it impacts on the information user." (Technology Transfer Process Model, 1978, p. 5).

By definition, transportation and communication within the country seem to be the main part of this factor element. Interpersonal communication also plays a relatively significant role as compared to the others. As stated by Jolly, Creighton, and George, "Interpersonal communication clearly plays an instrumental part in the information distribution process." (Technology Transfer Process Model, 1978, p. 6).

Before World War Two public transportation and communication in Thailand were rather poor. Most of the people slowly communicated among themselves within various small suborganizations via the poor systems. Rivers and canals were the main means of transportation. Only a small percentage of the people had radios and telephones. Television was not yet adopted.

Since 1966, after the First Economic and Social Development Plan was proclaimed, considerable progress has been achieved in the field of transportation and communication. Even under the Second Plan, this sector of national economy had the top priority so far as financing was concerned. At

present, public transportation and communication still have 14.7 percent of the total target expenditures, placing it third behind 37.8 percent for education and 15.5 percent for agriculture and irrigation (Summary of the Fourth Five-Year Plan, 1976, Table 9, p. 5).

The situation briefly described has improved the effectiveness of the distribution element of the model. To date, public transportation and communication of Thailand are much better than they were in the past. Most of the small towns are linked by highways. Rivers and canals are still widely used but mainly for trading purposes rather than traveling. Bangkok Airport is the most important air center in Southeast Asia and has made the country become more well known in the world because it is much more convenient for foreign people to visit the country. There are also many small airports spreading over the country which have helped accelerate the flowing of information within the country. For instance, a newspaper from Bangkok could be read by most of the people in the other parts of the country within one day. Televisions, radios, and telephones are much more widely used, but mostly by the people in big cities.

Many problems in the field of transportation and communication still exist. Traffic congestion, particularly in Bangkok, seems to be more and more unsolvable. The government of the country in each period has been trying to solve this problem but with only small success. Overpopulation and poor management in traffic systems have aggravated the

situation. Another problem in this field is the limited public communication services, particularly the telephone.

As stated in Telephone Statistic Report (Telephone Organization of Thailand, 1979), "By 30 September 1979, in Bangkok there were only 234,607 telephone numbers in service, 146,506 customers had applied for but had not yet received service." Considering the total number of people in Bangkok, over five million, it is apparent that only small percentages of them have accessed to telephone service. The percentages are even smaller in other cities.

As traffic congestion and limited telephone capacity have been on the barrier side of the Distribution element, the interpersonal communication within the country seems to be on the aiding side. The nature of the people and their ways of living have made this mode of communication relatively effective. As previously mentioned, most of Thai people prefer not to live far away from their parents and their relatives. They like to live near where they were born so that they know each other very well, especially among those people living in rural areas.

The people's way of life in olden times permitted them a lot of free time to contribute to their society. Agriculture, particularly rice growing, was the main occupation of the people and could be done in only certain periods of time, mostly in the rainy season. The people liked to spend their free time together. Even at harvest time they used to work as a group. They saved money by helping one

another perform their jobs on a one-by-one basis. When neighborhood helpers had finished the day's toil, they usually stayed on at the host farmer's place for dinner and entertained themselves by singing, dancing, and acting out some traditional plays. Chances to join and share, as they loved to do, were much more frequent during the slack season.

As Volentin Chu described in "Thailand Today," (1968, p. 143) "...the slack season that follows the harvest is a time of special merriment in the villages. Between festivals there are numerous excuses for parties."

Situations like that above created the strong personal relationship and effective interpersonal communication among Thai people. This is still a part of the people's nature even if the people's ways of living today are much different from what they were in the past.

In short, the influences of Thai organizational factors on this particular element of the model have created both a barrier and an aid to the knowledge and information transferring process within the country. The public transportation and communication have been on the barrier side while the interpersonal communication among the people has been aiding the process. Fortunately, the government of the country realizes this problem and has been trying to solve it. Hopefully, in the near future, this element might be an effective part of the transferring mechanism.

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c. Organization

This element of the model was defined by Jolly, Creighton, and George in "Technology Transfer Process Model," 1978, p. 6, that "This is the impact the formal organization of the potential technology user has upon the transfer effort."

The authors further described that "Under the title 'Formal Organization,' one would consider such things as the rules, norms, and role structure of a specific company, business or governmental agency."

Kogan, in "The Utilization of Social Work Research" (1963, p. 74), chooses to expand the idea of an organization setting even further, to include such factors as "...the

priorities of different aspects of a program, timeliness of introducing a modification in policy or practice, and the cost of new as compared with established procedures."

The importance of organization setting is stressed by Churchill and Ozanne, in "Adoption and Diffusion Research: A Potential Tool for Improving Technology Transfer," (1967, p. 19), who concluded that, "The characteristic of the firm and the decision making group should account for the variation in the dimension of the industrial adoption process." This conclusion is also supported by Baker, in "The Effect of Perceived Needs and Mean on the Generation of Ideas for Industrial R&D Project," (1966, p. 162), who found, "...knowledge of organizational problems, needs, and opportunities stimulated 75% of ideas."

Like the other elements of the model, in the sense that, each of them is not independent, they somewhat affect one another. For example, the Distribution, the physical channel through which technology flows, is obviously the consequence of the organization setting. Good organizational environment could also motivate the members to produce their new ideas which might be some day applicable to the organization.

As Well and Waterman, in "Space Technology: Pay-Off From Spin-Off" (1964, p. 118), stresses that "...for a company to overcome resistance to change it is critical that, management provide an organizational environment which motivates members to be innovative."

When considering Thai organization from the macro standpoint, centralization in public services, particularly the educational facilities and industry, seem to be the factors that have relatively great impact on the transferring process of knowledge within the country.

(1) National Education

About the public education, most of the educational institutions are run by the government, particularly at the college level and above. At present, all universities belong to the government and only a few colleges are private. National education is too centralized managerially and physiographically. The large number of schools, colleges, and universities are located in Bangkok, contributing to Bangkok's overpopulation. For example, it is not uncommon that the students studying in each university in Bangkok are from all parts of the country. Most of the students from the other parts of the country do not want to go back to their home towns after they finish the school because it is easier for them to find good jobs in Bangkok. Many of them try to bring their families including their parents and even their relatives to live with them in Bangkok and find them jobs giving them good opportunities for a new settlement. This has, of course, centralized knowledge and progressiveness in the Bangkok area.

The government of the country has also realized these problems and has been trying to solve them. As stated in the "Summary of the Fourth Five-Year Plan"

"One of the main strategies of the Fourth Plan is to accelerate the delivery of social services to the rural population in order to reduce the socio-economic gaps. The new approach to decentralize social services, particularly the educational facilities, health, social welfare, food and nutrition, to the rural and remote areas will contribute to achieving the objective of better income distribution, alleviating unemployment problems, and reducing the rate of population growth."

It was also stated that, "The present education system is not totally in tune with current social and economic realities and is not related to local needs nor the requirements of the labor market. Moreover, the curriculum used for various education levels are not self-contained. Pupils are thus obliged to extend their education to higher levels. In addition, there are problems of unequal opportunities in education and over-concentration of education administration." (Summary of the Fourth Five-Year Plan, 1976, p. 29).

As a part of the Plan, the essential features of the framework for educational reform included the following:

1. Decentralization of administrative authority in the education sector is to be made. The public participation in organization of local education will be encouraged.

2. The essential curriculum contents and the learning process will be improved and adapted to suit the

purposes of each level and type of education in each area. The learning process at each level should be self-contained and include practical knowledge.

3. The role and status of teachers and principal personnel will be modified so they can function as important vehicles for educational reform.

4. A plan of operation will be drawn up to phase out private institutions which provide compulsory education while encouraging them to supply more educational facilities at all other levels.

5. Out-of-school education will be expanded and should include vocational training relevant to local needs.

6. A more equal opportunity and right to utilize educational services will be laid down.

7. The mass media should be used to provide both formal and informal education. Priority will be given to informal education.

Educational development targets also included the following:

1. To transform schooling systems from the proportion of 4:3:3:2(3), the number of years of education in the level of elementary:secondary:high school (vocational), to 6:3:3 starting in the academic year 1978.

2. To expand the enrollments for compulsory education to an average annual rate of 6 percent by aiming at a total number of enrollments of primary education of 9.6 million by 1981.

3. To expand the enrollments for general secondary education at an average annual rate of 11 percent by aiming at a total number of enrollments of 3 million by 1981. New schools will be constructed at a rate of 100 schools per year.

4. To expand the enrollment of vocational education at an average rate of 8 percent per year for secondary vocational education and 15 percent per year for higher vocational education by stressing expansion in the field of agriculture, technology and industry, and to institute short courses.

5. To reduce the enrollments for teacher training course at lower diploma level to 3,000 students in 1981, but expand the enrollments at the higher diploma level to 5,800 students in 1981.

6. To expand the enrollments for higher education at an average rate of 4 percent per year.

Generally speaking, before 1977 the inappropriate schemes of national education had made this sector of national economy rather poor. However, if the Education Development Targets in the Fourth Five-Year Plan are met, a great improvement of this element of the model as well as the transferring process of knowledge within the country could be reasonably anticipated.

(2) National Industrialization

This sector of national economy has also had a significant influence over the transferring process of

knowledge within the country. Diversification of the economy which the Thai Government has been concentrating on seems to be an aid of the process while the centralization in its psysiographical aspects has somewhat created barriers to the distribution of knowledge.

As mentioned in Chapter II, the diversification of the national economy has caused the share of agricultural products to decline and other sectors increase. This national objective has helped bring in some new technologies and improve the public education, particularly in vocational sectors. Consequently, the process of transferring knowledge within the organization has been automatically improved. The efficiency of utilization of knowledge could have been higher if the national industrialization had been more decentralized at the same time.

As stated in the Summary of the Fourth Five-Year Plan (1977-1981, p. 25), under Industrial Development, "The Government will encourage the decentralization of industries away from the Bangkok area to the outlying regions through special incentives and the provision of basic facilities as well as financial assistance."

The overconcentration in and around the Bangkok region has created many problems to the country. Income disparities between the people in urban and rural areas and unequal opportunities in utilizing public facilities, particularly in education, are some of those problems. Fortunately, these problems have been realized by the government even if insignificant success has been achieved.

d. Selection Process for Projects (Users' contribution)

Jolly, Creighton, and George, in their Technology Transfer Process Model (1978, p. 7), said that "This factor refers to the selection process for research development undertaken by the source and the receiver's contributions to that process." The authors further stated that "Not every organization is in the position to provide input to R&D facilities as a given technology in being developed. A considerable amount of useful technology has been developed and remains "on the shelf" until a user's need is identified."

Rojer and Jain (1969, p. 9) supported this idea that "...a basic research for the lack of research utilization is that the process is often begun with the research process rather than the client's needs."

Brook, H., in his "Applied Science and Technological Progress," SCIENCE, Vol. 156, June 30, 1967, p. 1712, concluded that "Good applied research is of little value if the mechanisms do not exist to translate research results into goods, services, or operations."

In order to make a good applied research, existing technologies as well as knowledgeable people available in the organization are always the important tools for achieving the project's goal other than the identification of existing social or market needs. In Thailand this has been one of the major problems in developing the country. Many projects, in the field of R&D, needed higher technologies and more knowledgeable people than those available within the country.

A large amount of money has been spent for hiring foreign analysts, researchers and technicians to help carry out the R&D projects.

The present status of national economy is another constraint that has slowed down the expansion rate of R&D achievements. Existing domestic problems have forced the government of the country to reduce financial support for this sector to some extent. Resource crises, increase in unemployment. Degradation in the quality of skilled people, as mentioned earlier, resulted from the high population growth and inflation rate within the country. Fluctuation in world economic situations have caused critical domestic problems having higher priorities than do efforts to search for an unseen technology.

In reality, the country does need more effective mechanisms to help manage her existing resources and handle current problems more efficiently. It might also be economically justifiable, in the long run for the country to spend more money for R&D projects if an applicable technology relevent to the existing problems could be reasonably anticipated.

For a developing country like Thailand, the appropriate technology as opposed to the modern technology is the better tool for solving the critical problems. As E. F. Schumacher, in "Small is Beautiful," 1975, concluded in studying the problems of food shortages overpopulation, and unemployment in the developing countries: "...what

was needed were new tools that are better than what are being used. By better it did not mean more sophisticated or more complex, but rather tools that would be less expensive to buy and maintain, more labor intensive, and, where possible, manufacturable from local materials." Schumacher recognized the problem of matching the "Appropriate Technology" to the critical domestic problems.

J. S. Bortman, a Technology Transfer Coordinator at the Naval Air Development Center, Warminster, Pennsylvania, 18974, in Journal of Technology Transfer, 2(1), 1977, supported the idea by raising an interesting question, "If we can put a man on the moon, why can't we cure cancer, end hunger, make our cities livable, keep our environment clean, provide new energy sources? He further stated that, "Certainly, the High technology spinoffs such as air transportation, satellite communication, and integrated circuits, have affected our way of life, but the basic needs of our cities and rural areas still remain our biggest challenge." In his summary he concluded with the statements of Dr. Rene Dubos that, "We must now ask where science and technology are taking us, but rather how we can manage science and technology so that they can take us where we want to go."

In order to bring in modern technologies and knowledge, Thailand has been sending a lot of people to study in other countries, both from military and civilian sectors. Even if the project has been supported by the governments of many countries, the Thai Government still must spend a large

amount of money to finance the project. This program has not been very successful, from the author's personal point of view, because only a small portion of the modern technology and knowledge has been usefully contributed to the organization by these people. It seems that inappropriate selections of projects have caused the mismatch between what could be obtained from the projects and the realistic social needs.

There were also some other organizational factors that have constrained the growth pattern of this particular element of the model, such as the organizational structure, low average level of education of the people, and generation gaps. These factors together have somewhat affected the selection process for R&D projects and user's contribution to the projects.

2. Informal Factors

This group of elements of the model are less tangible, objectively measurable, and less subject to external control as compared to the elements of other groups, the FORMAL FACTORS. They deal more with people in an organization, especially those potential users and innovators of new technologies or ideas. These elements are the Capacity, Linkers, Credibility, Reward and Willingness. Each element is furthermore described as follows:

a. Capacity of the Receiver

Jolly, Creighton, and George, in Technology Transfer Process Model (1978, p. 9), stated that: "This factor refers

to the ability and capability of the potential user to utilize new and/or innovative ideas." Professor Creighton himself further discusses the meaning of "receiver" in a broader sense that it does not mean only one specific end of the communication. In each conversation both the speaker and the listener can be the receiver from one another. The listener receives the information being introduced from the speaker, and, at the same time, he gives some feedback to the speaker in forms of his own interest, satisfaction, and understanding about the subject. This feedback can be received more or less by the speaker depending upon his own capacity to receive it (from the conversation with Professor Creighton on 21 February 1980).

Rogers, E. M., in "Characteristics of Agricultural Innovator and Other Adopter Categories," (1961, p. 92), note that: "Innovativeness is the degree to which an individual is relatively earlier to adopt new ideas than the other members of his social system." The same author, in "Categorizing the Adopters of Agricultural Practices," (1958, p. 349), categorized individuals into five adopter groups, namely, innovator, earlier adopters, early majority, late majority, and laggard. He also specified that for a given innovation the first 2.5% of the individuals to adopt it was classified as "innovators."

Rogers (1961), in studying 164 Ohio farmers and a sample of 99 innovators established that innovativeness was negatively related to age and positively related to social

status, years of education, size of the business, business income and specialization, outside communication, and opinion leadership.

Out of those factors that Rogers believed to be positively related to an individual's innovativeness, social status and years of education seem to be relatively more important. They have a strong internal relationship with one another, i.e., how high an individual could be educated depends, in part, on his social status. How well a person could satisfy his basic needs mainly relies on his social status.

In Thailand, to raise the average level of education of the people has been a major national goal for decades. But only small success has been achieved, because of many other problems that have limited the capability of the government in providing financial support to this project. The national economy, income disparities among people in urban and rural areas, and inaccessible areas caused by physiographical aspects of the country have partially retarded the developing process of the public education.

At present only the first six grades of public education are compulsory and fully supported by the government. At the same time the problem of unequal opportunity and right for the people to utilize this public service still exist. A lot of people still must send their children to private schools and can obtain only partial support from the government even for the compulsory levels of education.

Children from various hill tribes are less likely to be well educated they have been living in inaccessible areas. The poverty of the majority of the people has also limited their ability to educate their children. A lot of smart youngsters had to leave schools relatively early and find jobs or help with their partents' work in order to improve the living condition of their families.

The way people live such as in big families or staying close to their relatives has been another cause that affects the growth of their innovative thinking or even the need of new inventions. Living in the same area for a long period of time has permitted the people to adjust themselves to fit into their surroundings and be familiar with all existing inconveniences. This differs considerably from the situations for many people in many other countries who move from one place to another many times in their lives and who tend to need better public services and facilities and be more innovative and relatively earlier to adopt new ideas in order to facilitate their living conditions in a new environment.

Another consequence of staying too long with one's parents is that there is less freedom for one to choose how to live. As mentioned earlier, most of the Thai parents have a great influence on their sons and daughters, particularly in choosing the way of living. Not many Thai students studying in high schools or in colleges have to work. Because most of them are totally supported by the parents, and, as a

matter of fact, it is not easy for them to find a part-time job. Therefore, how high one could be educated depends mostly on the parents' support.

The situation like this has created a strong interrelationship between Thai people and their parents. It has affected the way people live and also the way they think. Regardless of other advantages of this cultural way of living, it has caused resistance to change, affected the innovative thinking of the people, and limited their capacity to utilize innovations.

b. Linker Role

As defined by Jolly, Creighton, and George, in Technology Transfer Process Model (1978, p. 9): "This refers to the presence of, and the effects of individuals in the receiving organization who link or couple their organizations to the larger environment." The authors further state that "...these individuals operate within the same organization or social system as those who will actually use the new technology, filling the role of leader (gatekeeper and opinion leader), early adopter of innovation (innovator), and early knower of information."

The gatekeeper is a key person who controls and filters inputs into his organization as far as the flow of information and the transferring process of knowledge are concerned. It is mostly through the gatekeeper of an organization that new ideas or innovations are introduced into and utilized by the user within the organization. As stated

by Lewin, in "Forces Behind Food Habits and Method of Change" (1943, p. 37), "Entering or not entering a channel and moving from one section of a channel to another is affected by a gatekeeper."

Professor Creighton pointed out an interesting point of the gatekeeper's function in controlling and filtering inputs into his organization in the sense that in many cases the gatekeeper tends to be pessimistic in allowing an innovativeness or a new invention to pass through the organizational gate he is keeping. He may close the gate rather than to open it. The motivation from a linking agent outside of the organization can somewhat overcome this resistance (from the conversation with Professor Creighton on 21 February 1980).

In general, the terms "gatekeeper" and "linker" seem to be interchangeably used, but Theodore E. Elasser and Ralph Schneider in Journal of Technology Transfer, Vol. 2, No. 1 (1977, p. 72), further distinguished the gatekeeper from the linker in the sense that "...we will refer to "linkers" as agents external to the source or users organization; "gatekeepers" are those boundary players within an organization." They graphically showed the relationship between "gatekeepers" and "linkers" as shown in Fig. 12.

Czepiel, J. A., in "World-of-Process in the Diffusion of a Major Technological Innovation," Journal of Marketing Research, Vol. 2, May 1974, pp. 172-180, gave another view of the "gatekeeper" and the "linker" that "...the gatekeeper functions very like a second linker in the flow of

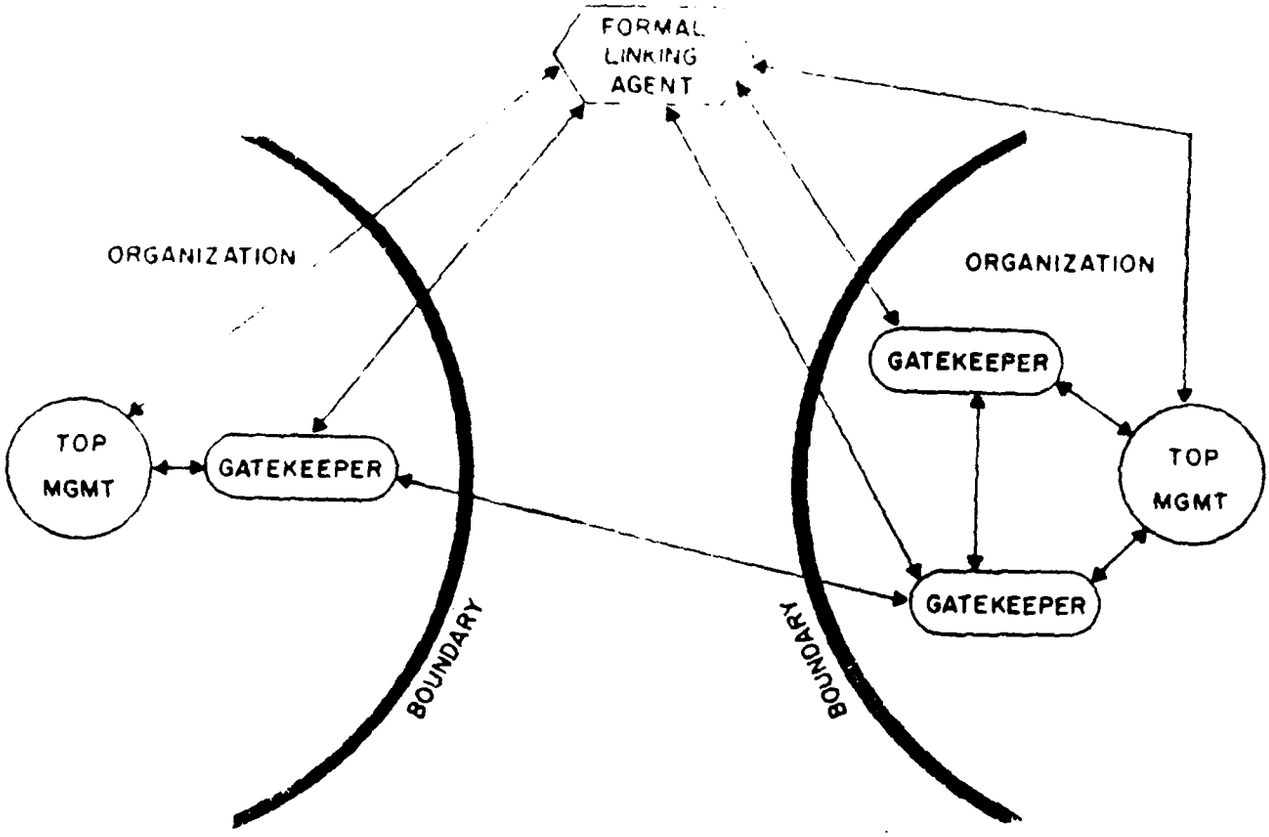

Fig. 12. The Flow of Information and Relationship Between the Linker and the Gatekeeper

information system. He actively seeks out information and then makes it available to the rest of the audience."

Furthermore, Elasser and Schneider (1977, p. 74) defined that "...a gatekeeper or boundary player is one who tends to look outside his immediate organization. He is sensitive to his environment and is usually one of the first to recognize change and adopt to it. He tends to look critically at the interface of his organization and larger environment."

This group of people, the gatekeeper and the linker, need not have a formal relationship with the top management of an organization or agency as far as the chain of command is concerned. They tend to influence the top management as well as other members of his organization by the interpersonal relationship between them and those people. To gain social benefits from the gatekeeper and the linker, top management can encourage their efforts and let them function naturally. To identify and train the gatekeepers of the future can also be beneficial to society, but how to train them is another factor that management should be aware of.

As stated by Elasser and Schneider, "Gatekeepers are born and not made. Hence formal training would be foolish. However, management should create an atmosphere which encourages internal linking."

Professor J. W. Creighton in his conversation on 21 February 1980, seems to disagree slightly with the idea

that the gatekeeper cannot be made. He believes that it is possible to develop one's linker characteristics. In tests to determine linking ability, he found that there are individuals who have few of natural linker characteristics, but who, because of the recognition of its importance, can cause the function to be accomplished. In doing this they tend to enhance their own capabilities.

In a developing country like Thailand, the average level of education of people is relatively low and most of the people are familiar with inconvenience in their environment. This has caused the people, as well as the country, to be behind from the technological standpoint. The other neighbor countries have been in similar situations. They could not provide a worthwhile interface for one another. One way to bring in modern knowledge and technologies is to send the people to study in another, more developed country. Each year a large number of Thai people are sent to study in the United States and some European countries. After they graduat, these people tend to be linkers of their organization. But they seem to be unable to perform their linking role effectively. The capacity of the receivers and technologies previously available in the organization are among the constraints.

As previously described, many existing domestic problems have limited the ability of the government to provide public facilities, particularly education, transportation and communication. As a result the capacity to

receive and utilize knowledge and innovativeness of the people is limited. This has generated the so-called "Knowledge-Gap" between the majority of people and those potential linkers. Not much from what they had learned from the source of knowledge outside the country could be effectively applied to their organization at present or even in the near future. What needs to be done is to bridge the "knowledge-gap" by raising the average level of education of people. The number of the future linkers should also be increased.

The generation-gap has been another factor limiting the effectiveness of the linker's function. As discussed earlier, older people and the leader of a group have been strongly respected by the group members for centuries. This has caused the situation in Thailand in which people functioning as top management or in high levels of the chain of command are relatively old, particularly in military organizations. Some of these people have been trying to catch up with the advance of technology and encourage younger people to innovate their new ideas to the organization. Many of them, however, are still conservative and insensitive to the change and need interface between their organizations and the larger environment. The latter group of people do not tend to encourage and define the linker of the organization. With the exception of Bhuddist monks, it used to be very uncommon that younger Thai people taught older people. But this trend has been significantly

changed in the last few decades. However, the generation-gap still exists and has somewhat caused the resistance to change in the country. It has also made the interpersonal communication between this group of people, the leader or top management of an agency, and the majority of the other members to become poor. Consequently, the role of the potential linkers becomes ineffective and a lot of innovativeness has died before it could usefully contribute to the country.

c. Credibility

This factor was defined in "Technology Transfer Process Model" by Jolly, Creighton, and George (1978, p. 10) as, "...the receiver's assessment of the reliability of the information before him." The same authors further noted that "It is evaluated as a factor in a model by analyzing both the source and the channel of the message. Because individuals have difficulty distinguishing between the source or origin of the message on the channel which carries that message to him, individuals will attach a composite credibility to the message derived from both perceived source and perceived channel."

George Gallup, in "The Absorbtion Rate of Ideas," Public Opinion Quarterly, Fall, (1955, p. 235), stated, "The character of the group most closely concerned or identified with the idea will be an important factor in determinig how fast it gets into the bloodstream."

The criteria actually used by the receivers in evaluating the message source was studied by Berlo, R. K., Lemert, J. B., and Mertz, R. J., in "Dimensions in Evaluating the Acceptability of Message Source," Public Opinion Quarterly, (1969, 33, p. 574). They identified three meaningful and statistically independent dimensions of source credibility: safety, qualification, and dynamism.

Griffin, K., in "The contribution of Studies of Source Credibility to a Theory of Interpersonal Trust in Communication Process," Psychological Bulletin, (1967, Vol. 68, No. 2, p. 107), further identified five categories of communicator which are perceived by message receivers as important in determining source trustworthiness and credibility. These perceived dimensions of the communicators are expertness, reliability, intentions, dynamism, and personal attraction.

Griffin also concluded the five characteristics mentioned as perceived by a listener to be the dimensions of a communicator's ethos (image) and further described each characteristic as follows:

1. Expertness relevant to the topic under discussion. This expertise may be in the form of quantity of pertinent information, degree of ability or skill, or validity of judgment.

2. Reliability of information source. This reliability may be perceived as dependability, predictability or consistency.

3. Intentions toward the listener, perceived by him as favorable or unfavorable.

4. Dynamism of the speaker as perceived by the listener, that is, communication behavior which appears to be more active than passive.

5. Personal attraction of the speaker for the listener, a dimension difficult to measure, possibly operating without conscious perceptions by the listener and without his knowledge of its interaction with one or more of the four factors listed above.

In addition to these five characteristics of the speaker which may be perceived directly by the listener, a sixth variable is discussed that influences the listener's perception of the speaker, that is "the majority opinion of the other listeners regarding the degree of trust that should be palced in the communicator."

Not only the characteristics of the communicator that affect the listener's perception, but the nature of the listener himself also significantly influences his own perception of the speaker and the source of information. One's knowledge and interest about the subject being introduced, for example, can help him, as a listener, make more or less realistic judgment about the credibility of the source of information as well as the communicator acting as a part of the channel carrying the information. One's judgment or perception of the speaker and the source of the information also depends, in one manner or another, on which adopter group he is in, as far as the five adopter groups categorized by Rogers are concerned.

Innovators, early adopters, and early majority tend to be more sensitive to a new subject being introduced as compared to those who are in the other two groups, late majority and laggard. They also have more realistic perception and judgment of the source of knowledge and the communicator. These people in the first three adopter groups are able to learn relatively faster and can gain more understanding from the same source of information and the same communication channel. They seem to rely less upon their enthusiasm for perceived credibility of the source and the channel.

For the late majority and laggard, how much they can learn depends more on their own interest about the subject and their perceived credibility of the source of information as well as the channel. "Knowledge-Gap" is another factor that has great impact on the ability to learn of the people in the last two groups. These people are less sensitive to the change in their environment and tend to ignore the advance of technology. When they are introduced to learn something new they cannot learn fast unless their "knowledge-gap" is bridged. The point is that the context of the subject being introduced is important as well. One is more interested in that in which he has had a good background.

Considering Thai people from the macro standpoint, even if a very small percentage of them can be categorized as innovators, and most of them are relatively less sensitive to change, but for the author's perspective, it does not mean that they oppose or resist it. They can be easily motivated,

especially by a clarified information promising a perceived reward. They tend to be optimistic, from the view of their perceived credibility of the source and channel of information being introduced. How much understanding they can gain from the information depends mainly on their background on that subject.

Among all the dimensions of the communicator previously discussed, the sixth variable described by Griffin, "The majority opinion" seems to have relatively greater influence on the perceived credibility of Thai people about the source of information and its channel. When one does not really know what he is introduced to is, hanging his belief on the side of majority opinion seems to be the smartest thing to do. At least he can protect himself from the so-called "social pressure." It is sometimes a shame that people's belief is mislead by the majority opinion. It might start from the belief of few people who are powerful and highly credible as perceived by other members in their organization.

The importance and power of a group's leader, as viewed by the group members, are other causes of an irrational majority opinion. As briefly described in the earlier chapter the Thai people had a long history of migration and fought with many enemies. The survivability of the group depended greatly on the leader's ability. This has made the leader of a group powerful and highly credible even in much different situations than at present.

In short, the effectiveness of this particular element of the model as related to Thai organization depends on two major factors: the "majority opinion" and the "knowledge-gap," the gap between the context of information being introduced and the background of the people about that information. It can be an effective aid to the transfer mechanism if the majority opinion is rational and the knowledge is bridged. The leader of a group and people who are highly credible play a significant role in forming the "majority-opinion."

d. Reward

This factor was defined by Jolly, Creighton, and George as "...the perceived payback and the social system of which the individual is a member." (Technology Transfer Process Model, 1978, p. 11).

As Lingwood and Morris in "Research into Use" (1976, p. 121) commented, "Obviously, rewards are the glue which holds an organization together and provides the response for individual needs for recognition of accomplishment...no researcher is going to get very involved in application work if he does not see a predefined and operating system of rewards for such a work."

Nyenhuis, K., and Welborn, J., in "Analysis of the Perceived Rewards to the Receiver and Its Impacts on the Predictive Model of Technology Transfer" (1976, p. 48) further found that how the reward structure of an organization is perceived by an individual will have a great impact on idea

flow and "...will determine in large measure his willingness to initiate idea transmission."

Pelz, D.C., and Andrews, F. M., in "Scientist in Organization" (1966, p. 39) divide reward achievement into two broad categories: "Reward intrinsic to the work itself (such as opportunity to use skills, to gain new knowledge, to deal with challenging problems, and to have freedom to follow up one's own ideas) and those extrinsic to the technical content (such as a good salary, higher administrative authority, and association with top executives)."

Deci, E. L., in "Effects of Externally Mediated Rewards on Intrinsic Motivation" (1974, p. 114) commented that extrinsic rewards, such as money, may even have a negative impact by working to "...buy off one's intrinsic motivation for an activity."

Maier, N. R., and L. R. Hoftman, in "Financial Incentives and Group Decision in Motivating Change" (1964, pp. 367-377) stated that "Extrinsic reward is apparently appropriate, however, when men are asked to accept a change that they fear deprives them from something."

Jolly, Creighton, and George concluded that "Although there is clearly a difference in the appropriateness and perceived importance of intrinsic versus extrinsic reward, neither can be ignored." (Technology Transfer Process Model, 1978, p. 11).

No one is willing to do something for nothing. So one's willingness to do a thing depends greatly on his

perceived rewards from what he is going to do. The two categories of reward, intrinsic and extrinsic reward, have different values to different people depending upon many factors such as one's social status, his level of education, and the adopter group he is in. Knowledgeable people, people in high social status, and innovators tend to have relatively more intrinsic motivation while the extrinsic reward is perceived to be more valuable to the others.

As mentioned earlier, the majority of Thai people are rather poor, and only a small percentage of them can be categorized as innovators. So the extrinsic reward seems to have more perceived value to them. There are also some other factors that have made the perceived extrinsic reward more valuable to the people than the intrinsic reward, but the major one is the need to improve their living condition. Success thus depends heavily on extrinsic rewards. Therefore, the knowledge or an information promising a perceived extrinsic reward to the people is more likely to be utilized.

The social system is another main factor affecting the utilization of an information, as far as the perceived reward is concerned. The perceived reward does not depend only on the context of the information, it also depends on the social system of which the individual is a member. The same information could promise different perceived reward to the potential user in a different social system, or to different users in the same system. One reason is the different application that an information has

for a different organization, as perceived by the members. From this standpoint the top management of an organization seems to play a relatively more important role in controlling the reward system of the organization. In order to increase utilization of an information, top management could provide an appropriate reward system. Even though an appropriateness is rather subjective and hard to determine, its importance should not be overlooked.

e. Willingness to be Helped

This factor element of the model relates to "...the individual's ability and/or desire to accept change in the organization of which one is a member." (Jolly, Creighton, and George, in "Technology Transfer Process Model" 1978, p. 11). The authors further stated that "Opposition to change is normal. It is wrong to assume that a blind reaction to technological change springs exclusively from some "causeless Bourdon distemper" that invades the mind."

Schon, D. A., in "Champion for Radical New Inventions." Harvard Business Review, Vol. 41, No. 2, (March-April 1963, p. 82) pointed out that "Opposition to change occurs because of a "normal human instinct" to protect oneself and more especially one's way of life."

Berlin, I. N., in "Resistance to Change in Mental Health Professionals," American Journal of Orthopsychiatry, 39(1), (January 1969, p. 115) further concluded that individuals resist change because, "...such change may reduce their status, financial return, sense of personal satisfaction, and feelings of competency."

From the author's personal point of view the willingness of an individual to be helped is positively related to his perceived credibility of the helper and his perceived rewards of the assistance, and is negatively related to his social status, his own capability to help himself, and especially, his own satisfaction with his being. Considering Thai people from macro standpoint, the majority of them have been rather poor and relatively poorly educated. This has somewhat limited their capability to improve their ways of living by making effective use of knowledge and technology. But some cultural and religious teachings, and their familiarity with their surroundings have made the people feel comfortable with their beings. They have been taught by the religion, particularly Buddhism, that "it is one's mind that makes one happy or sorrowful, not an unstable and uncontrollable surroundings." Many of them still believe that "the more you have the more you need, there is no need that can be completely satisfied."

In reality, Thai people may be broadly categorized into two major groups: city people and country people, as far as the culture, religion, and their ways of living are concerned. These two groups of people are much different, in nature, from one another. People living in a city deal more with the advance of technology, are more materialistic and relatively more enthusiastic. They are higher educated and influenced by western civilization. On the other hand, those living in the country are more religious and conservative,

less materialistic, lower educated, and more satisfied with their living conditions. These people are also more sympathetic than competitive, love to help one another, and, as a consequence, they have relatively strong interpersonal relationships as compared to the other groups of people.

Considering the willingness to be helped, of these two groups of people, the city people seem to be more capable to help themselves because they are more knowledgeable. They should be less willing to be helped. But, as a matter of fact, these people are more sensitive to change in their organization and keep on seeking a more comfortable living condition even if they have better opportunity to utilize public facilities and their ways of living are much more convenient. As a result this group of people tend to be more willing to be helped and are relatively faster to adopt to change because of their dissatisfaction with the existing living conditions. Contrarily, the country people have had a simple way of living, are less capable to utilize the modern knowledge and technology, or to understand or to make use of it. They have also had less opportunity to utilize public facilities. However, most of them have been more satisfied with their living conditions. This has made them relatively slower to adopt change and less willing to be helped.

As the national economy is further diversified and the social and educational development plan is more progressive, the number of city people gets larger while the

size of the other group, the country people, gets smaller. So the overall willingness to be helped of the people tends to be increased.

C. SUMMARY

This chapter is of major importance in the entire study. The predictive model, namely, the Technology Transfer Process Model as well as its elements are described. The elements are divided into two major groups: formal factors and informal factors. Formal factors are more tangible, objectively measurable, and subject to external control than the informal factors.

Formal factors are composed of the method of information documentation, the distribution system, formal organization of the user, and the selection process for projects. Informal factors are subdivided into: capacity of the receiver, informal linkers in the receiving organization, credibility as viewed by the receiver, perceived reward to the receiver, and willingness to be helped.

The effectiveness of each element of the model is discussed in relation to major organizational factors, e.g., national economy, cultures and religions, and characteristics of the people.

Because the Thai language is the only official language and most of the people know how to read and write it, documentation is an effective element of the model when considering the majority of the people.

The distribution system of the country is considered as a rather poor element having the public transportation and communication on the barrier side, and interpersonal communication on the aiding side, as far as the knowledge and information transfer process within the country is concerned. But the author believes that if the goal of the existing Economic and Social Development Plan is successfully achieved, the distribution system will be another effective element of the model. The centralization of national education and industrialization are identified as the major causes of the weakness of the third factor element, formal organization of the user. They have caused income disparities and unequal opportunities to utilize public services between the people in urban areas and rural areas. This has also created the barrier to the transferring process of knowledge and technology within the country.

Selection process for projects, the last element of the formal factors, is defined as an ineffective transfer mechanism. Lack of knowledgeable people, the gap between modern technology and technologies previously available in the country, and limited capability of the government to financially support R&D projects have caused an inappropriate selection process for projects.

Capacity of the receiver, the first element of the informal factors, is said to be limited by the low average level of education of the people and some cultural ways of living. To live in a big family and to live in the same

area for a long time are determined as the main factors constraining the growth of innovative thinking of the people and their needs for innovativeness. The strong interpersonal relationships between Thai people and their parents, and the influence that their parents have on them are also indicated as having impact on the way people think and the way they live.

"Knowledge-Gap" between the majority of people and the potential linkers, and the "Generation-Gap" between the linkers and some people functioning as top management are pointed to be the main factors limiting the linker's contribution to their society.

Perceived credibility of the listener to the source of an information and the communicator acting as a part of the communication channel is affected by the five dimensions of the communicator: expertness, reliability, intentions, dynamism, and personal attraction. Majority-Opinion and in which adopted group the listener is, are identified to be more significant factors affecting the perceived credibility of Thai people to the source of information and the communication channel. The majority-opinion may be, sometimes, irrational if it originates from only a few people perceived to be highly credible. As a result the majority of people may be mislead.

Reward is categorized into two broad categories: intrinsic reward and extrinsic reward. Each type has different value to different people depending upon their social status, level of

knowledge, and the adopter group they are in. Low average level of education and income of the people are considered as the factors that have made the perceived extrinsic reward relatively more valuable to the people. The top management of an organization plays an important role in providing an appropriate reward system.

Thai people may be broadly divided into two major groups; the city people and the country people. The city people are relatively higher educated, more materialistic, more enthusiastic, and faster to adopt change. Contrarily, the country people are lower educated, more religious and conservative, less enthusiastic, and relatively slower to adopt change. These people have simpler ways of living but seem to be less willing to be helped as compared to the people in the other group. The number of people in the first group gets larger while it gets smaller in the other group (the country people) as the public education, national industrialization, and western civilization are wide-spreading. Considering the majority of people, their willingness to be helped is increasing.

It is noteworthy that the elements of the model are dependent in nature to one another. The effectiveness of one element depends, in one manner or another, on the effectiveness of another element (or other elements). For isntance, good method of information documentation can provide a high perceived credibility as viewed by the receiver, an appropriate selection process for projects may

cause better perceived reward to the receiver, and so on. The detailed discussion about the dependency and inter-relationship of the elements of the model is beyond the scope of this study.

IV. CONCLUSION

In this chapter the main causes of barriers to the transfer process of knowledge within the country, from the author's perspective, are identified and briefly discussed. The major concerns are on the physiography of the country, national economy, and the capacity of the people as the receiver and the linker. The emphasis of the discussion is on how these three factors affect the knowledge transfer process.

A. PHYSIOGRAPHY OF THE COUNTRY

As described in Chapter I, Thailand may be physiographically divided into five major regions, namely, the Central Valley, the Continental Highlands, the Khorat Plateau, the Southeast Coast, and the Peninsula. The Central Valley is the only region having a large flat rich field very useful for rice growing, and some other agricultural and industrial purposes. The other regions are mainly composed of highlands, mountains and forests. In order to make an effective use of these lands, for agricultural and industrial purposes, it requires a good irrigation system, and a good transportation and communication system. Unfortunately, the existing systems are not sufficiently supportive.

The rich land of the Central Valley and better public services in this region have caused a relatively high population density, overcentralized industrialization, education

and other public facilities. Consequently, some areas in this region are overpopulated, particularly in Bangkok, the capital city of the country. The overpopulation of Bangkok has caused many deteriorative results, such as high traffic congestion, high crime rate, and dirty environment. Income disparities and unequal opportunities to utilize public services, particularly education, transportation and communication, between the people in urban and rural areas are other consequences.

Even though the government of the country in each period has been trying to overcome these problems by decentralizing the national industrialization and public facilities to rural areas, the rate of decentralization seems to be relatively too slow as compared to the increase in growth rate of population in all urban areas. Inaccessible areas in the other four regions is another critical problem limiting the user utilization of public services and social facilities, particularly education, transportation and communication. This has obviously affected the transferring process of knowledge and information within the country.

Size of the country has somewhat affected the way people live as well as the transfer process of information within the organization. Because Thailand is a small country, the total area is only about 198,247 square miles. This has permitted the people more chance to live in one place for a long time. In Thailand it is not uncommon for the man as the head of a family to work in one place and have his

family live in a different part of the country, e.g., two or three hundred miles far from his working place.

For an economic reason most of the Thai wives today go to work and have other lower educated people help take care of the children and do house work. It is more profitable to do so as far as the financing is concerned. When both husband and wife work, it is more likely for the husband to change his working place eventually, especially in military environments. It may cause a lot of problems if he had to move his entire family each time he is assigned to a new station. His wife might need to quit her job, the children would have to go to a new school, and, in some cases, they would have to quit their local business. So what most of the people do is if the husband has a new working place not too far from where they live, the rest of the family prefers not to move and have the husband come back home on the weekends.

In reality when people move from one place to another, they move not only the members of their families and their belongings, they also convey their knowledge, local culture, and innovative thinking to the new area to which they move. Therefore the more that people move, the better for exchanging processes of knowledge, culture and innovativeness among them. This can obviously increase the utilization of knowledge and improve the effectiveness of knowledge transfer process of an organization.

In short, the physiographical aspects of the country seems to have the greatest impact on the distribution system, an

element of the formal factors, as far as the technology transfer process model is concerned.

B. NATIONAL ECONOMY

As discussed earlier, Thailand is facing many critical domestic problems, such as resource crises, high inflation and population growth rate, unemployments, and degradation in quality of human resources. These problems have limited the capability of the government in developing the country and the people. One reason might be the dependence in nature of these problems. They somewhat affect one another, e.g., the high inflation and population growth rate have resulted in unemployment, poverty, and degradation in the quality of human resources. The government has been forced to solve these problems almost simultaneously. Consequently each of them is not perfectly solved in a short period of time.

Considering the effectiveness of knowledge transfer process and technology utilization within the country, it has been limited by many of the problems aforementioned. The progress of social and educational development seems to be the most important tool needed for improving the effectiveness. But it will take much time, need a lot of effort and other natural resources in order to provide successful progress.

Among the problems affecting the effectiveness of technology and knowledge utilization, from the national economic standpoint, high inflation and population growth rate are of relatively greater concern. They have caused

a lot of consequences resisting the transferring process of knowledge within the country. They have also resisted the national social and educational development. Obvious examples of the consequences are the poverty of the majority of people and degradation in quality of human resources.

As previously mentioned, only the first six grades of the national education are compulsory and fully supported by the government. So one's chance to be higher educated depends mainly on the support of his family. When the majority of people are poor they have less capability to financially support the education of their children. This has brought the average level of education of the people down to an extent and limited the capability of the people to utilize and receive more knowledge.

There are also some problems in the field of national economy that have somewhat affected the knowledge transfer process within the country, such as the limited system capacity of public transportation and communication, over-centralization of public facilities and national industrialization in urban areas, and lack of appropriate R&D projects. But, generally speaking, the need for the government to solve many critical domestic problems simultaneously has limited the capability of the government in providing good public education as well as other facilities, and developing the national economy as a whole.

C. PEOPLE AS THE RECEIVER AND THE LINKER

In this section only some characteristic of the people and other factors that have significant influence on their capacity to receive or utilize the knowledge, and the capability to relate new ideas to their organization of the potential linker are identified and discussed.

1. People as the Receiver

There are many factors that have limited the capacity of the people to receive or utilize knowledge. Most of these factors are resulted from the status of the overall national economy, culture and religion (mainly from Buddhism). Only some of them that the author believes that they are relatively more important and will be discussed. These factors are: parochialism, noncompetitive, and constrained interpersonal communication.

As described in Chapter III, the Thai people can be broadly divided into major groups, city people and country people, as far as their ways of living and thinking are concerned. At present the latter group is relatively much larger. The people in this group are more religious and conservative, less materialistic, and less enthusiastic. These people have been taught to be satisfied with what they have, pay more attention to mental development rather than to material development. They tend to prefer not to move from one place to another, be familiar with their surroundings, and less sensitive to change. They live in less developed areas and have less opportunity to utilize public facilities.

Even if their living conditions are less convenient as compared to those of the city people, these people seem to be more happy with their being and mentally healthy. This has made them somewhat insensitive to the advance of modern technology and relatively slower to adopt change. As a result, these people have lower capability to receive and utilize the knowledge and technology.

Noncompetitiveness in nature is another characteristic of the country people resulting from the culture and religion. Because these people are more religious and conservative, they have been taught to be satisfied with their being and happy with the other's success instead of being jealous. They like to help one another, join and share. This has somewhat limited their efforts to improve their ways of living in order to be ahead of the other members in their organization, as far as the social status is concerned.

Another significant factor affecting the transferring process of knowledge within the country is the constrained interpersonal communication between the majority of people and some other smaller groups, such as top management of an agent, senior and high credible people, and people in a higher social status.

In general the interpersonal relationship among the majority of Thai people is very strong. The interpersonal communication is also an effective mode of the public communication. But it occurs mostly among the people in the same level of social status. This is not quite beneficial

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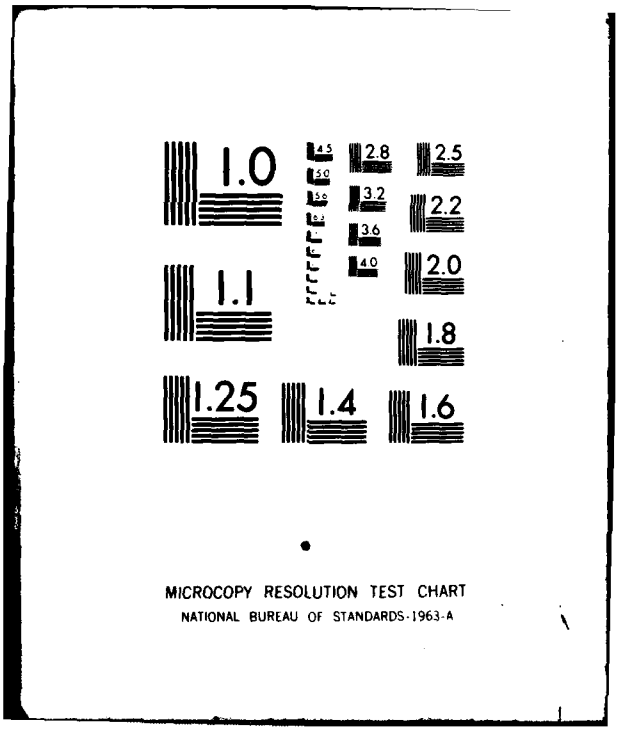
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to the society as a whole, as far as the transferring process of knowledge is concerned. The exchanging process of knowledge among them is not very productive because their ways of living and levels of knowledge are much different from one another.

A more important factor is the interpersonal communication between this major group and some specific groups of the people being higher educated and having higher social status as in previous examples. The so-called "greng-jai" described in Chapter II plays an important role in constraining this mode of communication among these different groups of people. It has created a barrier to the exchanging process of knowledge and ideas between the majority of people and the other groups. This is a significant factor when considering the effectiveness of knowledge utilization. Because of the difference in their social status and level of education people in the smaller groups have played bigger roles as the gatekeeper and linker of an organization. If the interpersonal communication between these groups and the majority of people is poor, the effectiveness of knowledge utilization is more likely to be low.

However, as the national social and educational development is in progress the group of country people gets smaller while the size of the other group, the city people, gets larger. So there is the trend that the overall capacity of the people to receive and utilize modern knowledge is increasing. But it is hard to say, from the macro standpoint,

that this is beneficial to the society as a whole. Because this development has caused a lot of disadvantageous consequences at the same time. Some examples are the ineffective consumption of natural resources and the low morale of the people.

2. People as the Linker

There are also many factors limiting the capability of the potential linker in Thai organizations to transfer their knowledge and innovative ideas to the other members. Those will be discussed are "knowledge-gap" between potential linkers and the majority of people, limited support from the government, and limited numbers of the linker.

As discussed in Chapter III, most of the potential linkers in the Thai organization are those people who are sent to study in another more developed country. The major financial support to their studying are from both the Thai government and the government of the other country. There are also many students that are further educated in a foreign country by the support of their own families. But in either case there are some factors affecting the appropriateness of their selected projects. For example, lack of previous knowledge about the project, and the contract between the two governments. Each of them can limit the chance for the student to choose what to study and directly affect the appropriateness of what was chosen.

When these graduated students come back to their country, they tend to be potential linkers of their

organization. But the "knowledge-gap" between them and the majority of people is the major constraint that has made them unable to effectively perform their linking function. It requires much time and effort to bridge the gap. This has made the problem unsolvable in a short period of time.

The limited support from the government of the country is another main cause that has limited both the number of linkers and the effectiveness of their linking function. As earlier described, the majority of Thai people are poor and their average level of education is rather low. To increase the number of linkers and help them effectively function their role, it needs financial and managerial support from the government. The financial support plays a significant role in creating the linker while the managerial support can help facilitate their linking function. But these supports are limited by some other factors, particularly the present status of national economy. Consequently, the number of linkers as well as the effectiveness of their linking function are limited.

There are also many others that have resisted the transferring process of knowledge within the country. But the author believes that three factors previously described are the major causes of most of the problems affecting the effectiveness of knowledge transfer process. The recommended strategy to overcome these problems is proposed and briefly implemented in the next chapter.

V. RECOMMENDATION

In this chapter a possible solution, from the author's point of view, to improve the effectiveness of knowledge utilization in Thailand is proposed and briefly implemented. It is assumed that the entire problem is to be solved at the government level. Because a reasonable solution to the same problem can be significantly different from another if that problem is solved at a different level, as far as the organizational structure is concerned. An obvious reason is the difference in the authority of the solvers.

The recommended strategy is composed of five major parts. They are: accelerate the decentralization of public facilities and national industrialization; improve public transportation and communication; develop a national education scheme; improve the selection process for R&D projects; and improve the documentation of modern knowledge.

The author realizes that some of these schemes have already been in the plan targets of the Fourth Five-Year Social and Economic Development Plan, the existing plan covering the period from 1977 to 1981. But they were implemented in the Plan in somewhat different ways from what will be discussed. Another reason is that all parts of the recommendation are arranged in order starting from increasing the capability and opportunity of utilizers by the decentralization, improve the channel of knowledge flow by a

better transporation and communication system, modify the system of national education and provide better facilities to potential users by the last three parts of the recommended strategy. Therefore it is more reasonable to keep all of them together.

A. ACCELERATE THE DECENTRALIZATION OF PUBLIC FACILITIES AND INDUSTRY

As described earlier, income disparities and unequal opportunities to utilize public services among the people in urban and rural areas have been major causes of many problems including the low average level of education of the people and low efficiency of knowledge utilization. These causes are resulted mainly from the overcentralization of public facilities and national industrialization in and around urban areas. In order to overcome these problems, it is necessary for the Government to increasingly decentralize the public facilities and industry to rural areas. This will help promote employment and increase income as well as the opportunities to utilize public services of the people living in those areas. Their capacity to receive and utilize knowledge will also be increased. The children will have more chances to be higher educated as their parents' incomes are increased. Other than that the population density in and around urban areas is likely to decrease, because less people in rural areas will be willing to leave their hometown to make a new settlement in an urban area.

The decentralization of public services and industry to rural areas will not only help increase the capacity of the people in those areas to receive and utilize knowledge, it will also bring modern technology and knowledge to the people living in those areas. As a result the process of transfer knowledge within the country will be drastically improved.

However, the degree of success of these schemes obviously depends on the national policy in developing the country. More specifically, it depends on the government which has a major control in providing the national policy. Those executives play a bigger role in shaping and organizing the national education and industrialization. But their capability also depends on some other organizational factors, especially the status of national economy.

B. IMPROVE PUBLIC TRANSPORTATION AND COMMUNICATION

To go along with the first part of the recommended strategy, it is necessary for the government ot actively improve the public transportation and communication. This will be an effective aid to the progress of the decentralization.

As previously described in Chapter III, the distribution system is a weak factor element of the model having poor public transportation and communication as major causes. The weakness will be directly overcome if this part of the recommended strategy is successfully achieved. The problem of unequal opportunities between the people in urban and rural areas to utilize public facilities will also be partly removed. Other than that the people living in rural areas will be able to

make more effective use of their lands and the number of inaccessible areas will also be considerably reduced as the public transportation and communication are improved.

One possible way to achieve this goal is to partially decentralize this sector of public services to private sector and encourage investment by providing a reasonable support. (At present the whole sector is run by the Government.) To promote competition among civilian firms is a necessary tool for the government to control the price of the services not to exceed a reasonable limit.

C. DEVELOP THE NATIONAL EDUCATION SCHEME

There are two major ideas concerned with this part of the recommendation: to extend the compulsory level of national education, and to increase financial support to this level of education.

As described in Chapter III, only the first six grades of national education are compulsory and totally supported by the government. This has limited the opportunity of the people to be educated to an extent, particularly of those poor majority. Therefore, if the government extends the compulsory level of education from the first six grades to nine grades instead, and provides as much financial support as the national economy can afford to the whole compulsory level, the average level of education of the people will be significantly raised. However, the main constraint to this scheme is the limited budget. A detailed analysis in evaluating and ranking the priority of this project as compared to the others should be made.

D. IMPROVE THE SELECTION PROCESS OF R&D PROJECTS

As stated in Chapter III about the selection process for R&D projects, the major problem that has made this factor element become poor is an inappropriate selection process for the projects. It has caused a mismatch between the project achievement and the real social needs. In order to overcome this problem the selection process has to be improved, the number of R&D projects should also be adjusted to a reasonable extent.

To successfully achieve an appropriate selection process one possible way that management can do is to first identify the real social needs, i.e., what we want the future to look like. Secondly, we determine the present status, where we are now and what we have. Thirdly, we can find all reasonable possible alternatives and evaluate each of them against one another by a proper analysis and finally choose the best alternative according to the result of the analysis. However, an appropriateness if not objectively measurable and is hard to identify. The availability of knowledgeable people and technologies within an organization seems to be a necessary tool that can help achieve it.

When the selectionprocess for R&D projects is appropriate it is more likely that an appropriate technology, as a result of an R&D project, will be achieved. It will be an effective aid to help shape the society to look like what was intended.

E. IMPROVE DOCUMENTATION OF MODERN KNOWLEDGE

Because a lot of knowledge, particularly what is being studied in colleges and universities, is still being documented in another language, from a source outside of the organization, this has limited the number of utilizers as well as the knowledge utilization. Even if only a small number of people are involved in this level of education, these people are more likely to be future key personnel of their organization, e.g., top management, gatekeepers, and potential linkers. If all of the knowledge were documented in Thai language not only the capacity of the people to utilize it will increase, but so the number of potential users will increase.

F. NOTE

It is observable that this recommended strategy does not overcome all of the problems in knowledge transfer process previously discussed. But the author believes that it can significantly improve the effectiveness of knowledge utilization within the country, help raise the average level of education of the people, and provide many other advantageous consequences to the country.

Another reason is some causes of the problems aforementioned require too much time and effort to remove them. Some of them also have more valuable advantages to the country as a whole, such as the so-called "greng-jai" and "katanyoo-katawetee." These characteristics of the people have created

a strong interpersonal relationship among them, especially within a family. They have caused love, compassion, kindness, and sincereness among the people. So it would be disadvantageous to the society as a whole to have these characteristics resolved. However, as the social and educational development is in progress, modern technologies and some western cultures are more wide-spreading over the country, the religious and cultural ways of living and thinking are gradually dying out.

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